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UNIVERSITY OF ALBERTA

APPLIED DECORATIVE DESIGN ON HANDWOVEN CLOTH INSPIRED BY THE TEXTILES OF SUMATRA, INDONESIA.

BY

LESLEE GAYLE MUC

(C)

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF SCIENCE

DEPARTMENT OF CLOTHING AND TEXTILES

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled APPLIED DECORATIVE DESIGN ON HANDWOVEN CLOTH INSPIRED BY THE TEXTILES OF SUMATRA, INDONESIA submitted by Leslee Gayle Muc in partial fulfilment of the requirements for the degree of Master of Science in Clothing and Textiles.

Marlene Cox-Bishop
Supervisor

Carol Bachynski

David E. Young

Date: July 14, 1989

ABSTRACT

The purpose of this study was 1) to investigate the textiles produced in Sumatra and to discuss their cultural significance, motifs, patterns, and applied and structural methods of production, 2) to explore the applications of these motifs and methods as the basis for new textile design, and 3) to produce a collection of textiles for interior decor, integrating handweaving with applied decorative design, as inspired by Sumatran motifs and methods of production. Study samples were produced for motifs, spatial arrangement, colours and techniques.

The textiles from five regions of Sumatra were chosen to serve as inspiration for the final textiles. Silk, cotton, gold thread, mirrors, sequins, and Procion H dyes were chosen as raw materials. Motifs focused on geometric and floral images. Spatial arrangements represented corner sections of Sumatran textiles depicting various arrangements of borders and a center-field. Red, white, blue, violet and gold yellow were the colours used. Techniques chosen included warp-painting, supplementary warp and weft, screen printing, direct painting, wax resist, application of mirrors and sequins, and embroidery. Six textiles were completed using these parameters.

The Designer's Statement includes a discussion and analysis of the commonalities lending unity to the textiles. The uniqueness and specific inspiration of each textile design was discussed individually.

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INTRODUCTION

> "The search for beauty is universal in human experience. Its innumerable forms have sprung from the play of the creative imagination, and afford some of the deepest satisfactions known to man" (Herskovits, 1955).

Historically, researchers within the field of Home Economics have shared the common goal of improving the quality of life for individuals and their families. Initially, emphasis was placed on the physical aspects of individuals' needs as stressed by Maslow. However, as the field of Home Economics has developed, a more holistic view of the requirements for total health has included not only the satisfaction of basic biological needs, but also the need for life enrichment. This broadened view acknowledges the importance of the psychological and social development resulting from the interaction between mankind and the near environment. Some of this development is a result of the psychological pleasure and satisfaction perceived when receiving aesthetic visual change in the environment. Design is one vehicle for offering this visual change and stimulation. Within the field of Home Economics, the specialty of textile design contributes to human development by helping to fulfill the need for new aesthetic designs with which to embellish our environment.

Creative Adaptation and Evolution of Design

In her 1972 thesis, Fu states "A creative adaptation is an artistic work based on motifs from previously existing art objects, with deliberate emphasis not on exact imitation but rather on a restatement and amplification of the aesthetic content of the original".

Standards of taste, aesthetic systems, and design change over time and can be considered an evolutionary process. All designs have roots of inspiration buried in other sources. The inspiration may be from the past or from the present; from indigenous sources or cross-cultural sources; or based on the natural, man-made or surreal.

The expansion of creative design through historical and cultural inspiration is not a new concept in art. Art of the Mycene inspired the Greeks; the Greeks inspired the Romans; the Persians were inspired by the Assyrians; and the early Christians by the Arabian cultures (Fu, 1972; Gillon 1974). Among others, Oriental and Indian influences can still be seen in today's textiles.

To add to an already complex concept, the creative process for the individual designer is an ongoing cycle of observations, emotions, thoughts, intuitions, and sensations. As a result, the personal nature of the designer's aesthetic experience influences the design choices made and renders a strong subjective quality to the design process. This makes each design process a unique one, thus contributing to the creative adaptation and evolution of design.

Purpose and Objectives

The textiles of Sumatra can be used as design inspiration for the production of textiles by the contemporary designer. The purpose of this study is to investigate the various indigenous Sumatran textiles, including their design, motifs, and methods of production. The research will result in the adaptation of selected styles and techniques to textiles produced by the designer.

The specific objectives of this study are:

1) To investigate the textiles produced in Sumatra and to discuss their cultural significance, motifs, patterns, applied and structural methods of production;

2) To explore the applications of these motifs and methods as the basis for new textile designs; and

3) To produce a collection of textiles for interior decor, integrating handweaving with applied decorative design, as inspired by Sumatran motifs and methods of production.

Justification

"The ultimate goal of research in home economics is to maximize the satisfaction and well-being of individuals and families through increasing knowledge and understanding of man and his immediate environment - his physical, cultural, and social milieu." (Schlater,1971).

"Art is an integral part of everyday life. Aesthetic sensitivity is fundamental to full and effective living" (Van Dommelan, 1968).

Home economics may be viewed as human ecology, in which the primary objective is improving the well-being of families through education, research, and community service. Art and design in home economics is an important interdisciplinary factor linking many fields of study that influence the near environment thus affecting this primary objective. In her 1971 publication, Schlater lists five nationally recognized goals for research in home economics. The research conducted in this study contributes to three of these goals.

The first goal is the improvement of the conditions contributing to mankind's psychological and social development. Aesthetics may be viewed as an interaction between materialism and the human audience. The aesthetic experience is a complicated, yet harmonious blend of motivation, reasoning, judgement, and emotions, all contributing important aspects to mankind's total psychological growth. Exposure to new art provides new experiences in art appreciation and criticism, which help to develop aesthetic sensitivity and sensory awareness. This contributes generally to the individual's skills in perception, contemplation, and discrimination, providing a depth and strength to their emotional identity. Environmental stimulus through aesthetics is essential for cognitive and emotional growth.

Social development may also be enhanced through exposure to new

art which, through its uniqueness, may spur analysis and discussion in a social environment. The cross-cultural nature of this research may help stimulate interest in and appreciation of the art and customs of other cultures.

The second goal which is consistent with Schlater's discussion is the improvement of the physical components of mankind's near environment. Colours, forms, and shapes offer visual stimuli which cause humans to react to the environment. By offering new, and visually aesthetic stimulation, textile designers can enhance the quality of that reaction with the environment. The two facets of the near environment that may benefit from this research are 1) the aesthetic aspects of housing and environs, and 2) the creation and design of clothing.

A third goal is the improvement of the quality and availability of community services which may enrich family life. Art in home economics may be viewed as an educational tool. Community recreation and further education extension programs are flourishing as a means to enrich the quality of human life through new learning experiences. The mixed-media techniques combining handweaving with applied design techniques, as explored in this study, have rarely been documented. Public exhibition of the textiles produced from this research will undoubtedly spur interest in the production methods used. This may encourage textile designers and fiber artists to expand their fields of study in anticipation of offering new further education course material to the public at large. By encouraging creative thought

processes, these educators are helping students to increase their problem-solving skills, which in turn may be utilized in all aspects of their lives.

In his article "What is art in home economics?", Van Dommelan (1968) states:

> "Research is a necessity of art in home economics if this discipline is to contribute ideas to individuals, teaching, and other professions. Research in the area of art in home economics can take many directions - historical research, case studies, descriptive studies, and experimental design all have a place. Creative project research also is of importance in order that the textile designer, furniture designer, and interior designer can find new ways of bringing ideas to people. Each aspect of research can and does contribute new knowledge in this area of art which is wide open to new thoughts and experiences"

Although textiles were first produced by primitive peoples to fulfill basic human needs for clothing and shelter, they were often decorated or embellished in some fashion, indicating that the aesthetic appeal of the textile was also important. There is a protective quality expressed by the visual as well as the physical presence of a cloth surface. Whether used as clothing, upholstery fabric, or wall decor, the visual textural warmth of textiles adds a humanizing element to the near environment. This concept is especially relevant in the 'concrete

jungles' of western world metropolises. Since textiles are more versatile in providing this humanizing element than are some other forms of art media, this author feels more emphasis should be placed on textile design research.

Cross-cultural inspiration has been chosen for this body of work. The designer has subjectively chosen Sumatran textiles as the specific area of study due to personal interest in the geographical location, the mixed media textile production techniques used there, and the availability of background information. The Sumatrans practice both weaving and a variety of decorative design techniques in their textile production and the their fabrics are rich in history and design.

Methods of interpretation influencing inspiration differ between cultures. The author feels that the method of interpretation must be guided by the potential end use of the textile. Since the textiles to be designed in this study will be used in interior decor in the western world, the visual interpretation of the Sumatran textiles will be emphasized versus the symbolic interpretation which might be emphasized by the Sumatrans. The visual warmth offered by the rich colours, natural materials, and textures of the mixed media techniques seen in the tropical Sumatran textiles can be used to add warmth to our visually and physically cooler environment. The challenge to the designer is to work within given limitations to adapt Sumatran designs in the production of designs for use in our own cultural environment.

Further justification for this research stems from the fact that very little has been documented regarding the integration of handweaving

with surface design techniques. Only three theses from the United States (Mezera, 1974; Bock, 1983; Baker,1983) and no Canadian theses were found which distinctly combine these media.

Documentation of the textile design process using cross-cultural textiles as inspiration was also limited. Of the ten theses found from the United States that related to this field, none focus on Indonesian textiles and none demonstrate a framework adequate for use as a model in this type of exploratory research.

Although some textile designers have undoubtedly been doing studio work related to these types of studies, it is rare for them to document their work. Therefore, it appears that there is a shortage of and a need for further documentation in the areas of 1) integration of handweaving with applied decorative design techniques in modern textile design, and 2) the use of cross-cultural textiles as textile design inspiration. The study and documentation of Sumatran textiles as design inspiration would contribute to the body of research in the latter field.

Besides textile design in home economics, research in this area is relevant to studies in fashion design, interior design, anthropology, sociology, museology and history. It may also be used as a methodological research model for further studies in textile design.

Limitations

Data collection will be limited to:

1) the study and analysis of Indonesian textiles, focusing on those from Sumatra;

2) the availability of primary sources of information; and

3) the availability of secondary sources of information that are written in English.

Methods of production used in creating the textiles in this investigation will be limited by:

1) the availability of raw materials and equipment;

2) the subjective selection of motifs and colours inspired by indigenous Sumatran textiles; and

3) the subjective selection of appropriate raw materials and techniques as inspired by indigenous Sumatran textiles.

The final designs will be limited to:

1) the methods of production chosen and

eg. a) the coarseness of the handwoven cloth may limit small printed detail.

b) handweaving lends itself to geometric designs.

2) the number of completed fabrics which will thereby represent only a small number of design possibilities.

LITERATURE REVIEW

Preparation for research in this field of study necessitated a literature review in four general areas:

1) textile design using cross-cultural textiles as inspiration;

2) textile design integrating handweaving with surface design techniques;

3) theoretical and technical information relating to textile design; and

4) the historical background of Indonesian textiles, focusing on those of Sumatra.

Cross-cultural Textiles as Inspiration

The earliest reference found by the author which documented the research of cross-cultural textiles for use in contemporary textile inspiration was the masters thesis of Harris (1937). She studied traditional art forms from several countries before adapting their symbols and motifs to produce original textile designs. Eight different processes were used in creating the textiles.

Seventeen years later, McHaffy (1954) reviewed the use of traditional motifs in modern textile design. She documented the historical evolvement through adaptation, of several subjectively chosen design motifs. A questionnaire survey done by McHaffy indicated that "from a commercial point of view, as well as that of a designer, those

designs traditional in inspiration are more significant than those purely abstract in character, in that the designs have a longer life, are kept in stock longer, and are not believed to disappear from the field quite so rapidly". She concludes that art of the past has been successfully used by leading designers.

Haden (1965) documented her more focused study of ancient Peruvian textiles and her adaptation of their designs, motifs, and colours to modern textile design. In order to gain an understanding of the lives of these ancient peoples, and of their textiles, Haden reviewed their geographical, historical, and cultural backgrounds. She specifically studied the motifs, colours, symbolism, equipment, and techniques used in their textile production. A questionnaire survey revealed that in both Peru and in the United States, adaptations of ancient motifs were produced in modern colours on contemporary textiles.

Goethalis (1969) used current West African art and craft items and methods of production as inspiration for creating several contemporary designs. These were executed using batik, screen printing, tie-dyeing, printing, stitching, photographic silk screen processes, and drawing techniques.

During the early to mid 1970s interest in a more focused type of cross-cultural study was apparent with the completion of four theses in the United States. Fu (1972) studied ancient Chinese motifs for use in contemporary textile design. Campbell (1972) translated design motifs and methods of production from the Ashanti tradition in Ghana for use

in contemporary fabrics. Each textile used one of five production techniques: screen printing, weaving, batik, block printing, and tie-dyeing. Similar studies were done by Merriam (1973) who focused on the San Blas Cuna Indians of Panama, and by Richer (1976) who investigated woven silk patterns on textiles of the Chinese Han Dynasty.

In the past decade only one related study was found. Baudoin (1984) used decorative designs and production techniques from West Africa as inspiration for production of contemporary textiles.

The above theses are somewhat consistent in 1) their use of another culture for textile design inspiration, 2) an initial investigation of the historical background of the culture to be documented, including a detailed study of the textiles, and 3) the use of a variety of techniques for the execution of the new textile designs. These features were incorporated into the present study of Sumatran textiles and their use as inspiration for modern textiles.

Textile Design Integrating Handweaving With Applied Design

In her 1953 article, Tidball reviewed the basic techniques and problems encountered in the production of chine, the ancient process of warp painting. No further information was found by the author until a 1970 article by Marston once again described the basic technique of warp painting. No documentation of applied art work using these or related techniques was found before this date.

Research documenting the integration of handweaving with

applied design has been extremely limited, with only three theses found in the United States and none in Canada. Mezera (1974) investigated the use of screen process printing method to print a design on the tensioned warps in handwoven fabrics. Using three experimental warps (cotton, linen, and rayon), she studied the interaction of the warp fiber and colour, set, weave, weft, and print. Assessments were made to determine which combinations would achieve a clear and forceful design statement. For the greatest clarity of image her results indicated the use of 1) a neutral colour in both the warp and weft; 2) a warp yarn which was inelastic, relatively fine, and which would allow thorough dye penetration; and 3) a warp-faced weave. She concluded that the screen process method to print design on tensioned warps promoted good dye penetration, allowed speed and ease of design replication, and offered the possibility of precision edges of the design motif.

Baker (1983) explored free-hand techniques for creating weaving design through control of dyeing procedures through 1) immersion of fiber into a dyebath, 2) dip-dyeing selected portions of yarn into dyebath, and 3) dye painting materials before weaving. Although it was determined that all three dye methods could be used to create design effects, she concluded that warp painting was the most versatile of the three techniques. Three major projects were completed to demonstrate the accuracy of dye formulas in reproducing colour and the effectiveness of creating design by manipulating dyes.

Bock (1983) explored the airbrush application of dyes to the textured

surface of handwoven waffle weave fabric. She described the development of her images as they were inspired by microscopic close-ups of the wings of butterflies. Bock summarizes the evolution of fiber art particularly as it has occurred during the past two decades. One major change began during the 1970s when a few designers and artists began combining the production of various fiber media with a painted or dyed surface design. She briefly discusses the work of these artists: Lia Cook, Kenneth G. Mills, Neda Al-Hilali, Lewis Knauss, and Katherine Howe.

The work of Lia Cook is well-known and has been documented by several authors (Janeiro, 1980; Westphal and Rossbach, 1981; Alexander, 1982; Connor, 1985; Rowley, 1985). Her textiles have been characterized by complex weaves produced on a 20-harness dobby loom. After being woven, the fabrics are washed, pressed, hammered while still wet, blocked to dry, then painted with dilute paints and pigments. Cook characterizes herself as continually moving on, exploring and devising new forms, resulting in a steady progression of ideas and process (Janeiro, 1980).

Theoretical and Technical Information Relating to Textile Design

Within the last two decades especially, numerous publications have become available which serve as good reference materials for the textile designer. Some of the major and most recent books which together provide comprehensive coverage of textile design include Ward

(1973), Mills and Smith (1985), Yates (1986), and Fisher and Wolfthal (1987).

Ward (1973) focuses on structural textile design such as weaving. He tends to discuss textile science topics in order to answer why the design media work and why they can be manipulated in various art forms. This type of information bridges the gap between art and science. Ward emphasizes organization of thinking, and the importance of colour and light as aspects of design. He states that "designing textiles is essentially constructing a large unit from many small elements". Building from components means the final effect can not be fully visualized until the work is finished. During textile production, the designer may not have total control of the tools, media, or equipment used (Ward, 1973). However, the maintenance of maximum possible control is an important factor which serves to designate the designer a professional.

The Mills and Smith (1985) publication gives a comprehensive coverage of the elements and principles of design. The authors discuss each aspect of design individually beginning each section with the "relevance to design".

Yates (1986) discusses both textile print design and the design of woven textiles in her book. She begins with a discussion of the role of textile designers, and later discusses more technical information including the wide variety of materials available for textile design. Throughout her book, she gives a complete discussion of the various steps involved in design layouts of motifs, rendering techniques, textile

printing methods, designing woven fabrics, colour, repeats, and presentation of designs.

Fisher and Wolfthal (1987) are concerned primarily with printed textile design. They give a step by step outline of the process of creating original designs for commercial use, thereby aiming at those interested in designing for industry. The major topics of discussion include the importance of research, tools and supplies, elements of design, how to proceed, presentation of designs, colour, repeats, production considerations, and business practices. Of particular interest is the large section dealing with the variety of rendering techniques that may be used to portray different media.

Day's 1979 book, Pattern Design, was first published in 1903. This is an excellent reference source, analyzing both simple and complex forms of floral and geometric design repeats. The original line drawings illustrate the construction, expansion, and application of a whole range of design problems.

Other publications focus on more specific media and techniques which may be applied in textile design. Frey (1975), Tidball (1976), Brown (1978), Kurtz (1979, 1980), Black (1980), and Moorman (1980) are excellent references in the field of weaving. The topic of resist techniques such as tie-dye, ikat, and batik are discussed by Maile (1965), Meilach (1973), Anonymous (1975), Battenfield (1980), and Joshi (1984). Fabric printing and painting are discussed in Russ (1965), Schwalbach and Schwalbach (1970), Gooch (1974), and Katz (1982). Embroidery techniques are covered in Fisher (1973), and Silverstein (1977).

Indonesia

Geographical and Historical Background

The Republic of Indonesia is composed of a group of islands in Southeast Asia extending more than 3200 miles west to east along the equator south of China and east of India (Figure 1). Its more than 13,600 islands, of which approximately 1000 are inhabited, make up most of the world's largest archipelago. The five islands of Java, Sumatra, Sulawesi, Kalimantan, and Irian Jaya account for 90% of the land area of Indonesia. Jakarta, on the island of Java is the capital of the republic and the center of national life. Because these islands lie at the crossroads of the South China Sea and the Indian Ocean, the country has been subject to trade influences (Figure 1) and migrations of people from the Asian mainland, resulting in a merging of foreign beliefs and customs with those of the indigenous people.

With its population of over 173 million (Kurian, 1987), Indonesia is the world's fifth largest nation, representing diverse cultures of over 350 ethnic groups speaking at least 25 languages and 250 lesser dialects. Bahasa Indonesia is the lingua franca with English being the official second language.

Indonesia has the largest Muslim population in the world with nine-tenths of Indonesians being Muslim. Indonesian Islam is divided between the Santri or orthodox Muslims, and the Abangan or nominal Muslims. The Santri strictly observe the five pillars (rules) of the Islamic faith while the Abangan follow an amalgam of animistic,

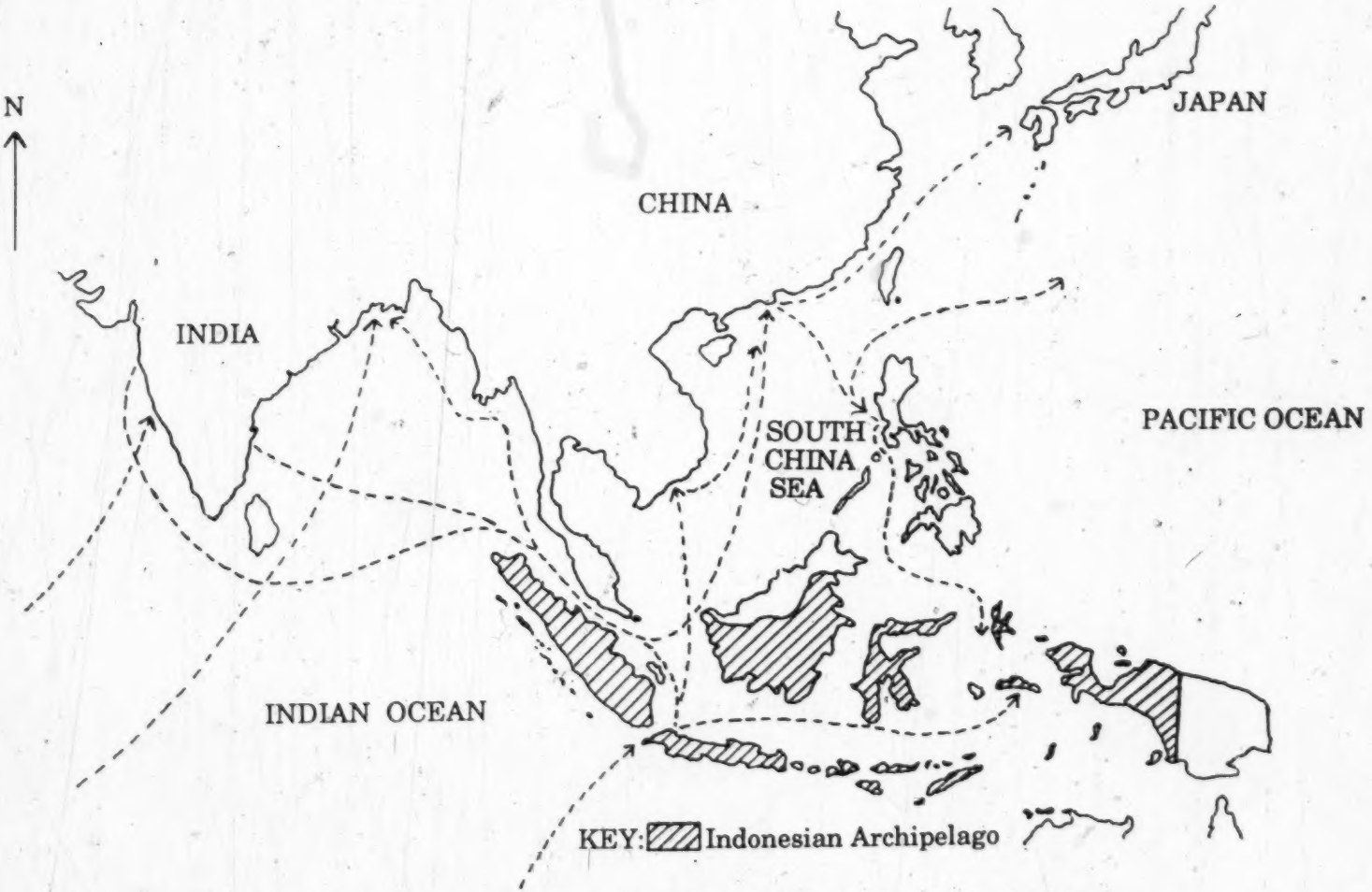

Figure 1. Major Asian Trade Routes in Relation to the Indonesian Archepelago.

Hindu, and Muslim beliefs, rituals, and institutions. Six million Christians form a sizeable and influential minority. The Batak in Sumatra are one of the more important Christian groups (Kurian, 1987).

Geographically, the people of Indonesia can generally be divided into two categories: the coastal people and the hill tribes. The coastal people typically have further developed and more diverse cultures due to the exposure of the indigenous peoples to several other cultures through trade. Hill people such as the Batak of Sumatra tend to be more isolated geographically and therefore have retained and developed the earlier animistic elements of their indigenous culture .

The climate of Indonesia is hot year around. There are no seasons and days are all twelve hours long. Humidity hovers around 80%.

Textile design in Indonesia has been a long evolutionary process brought about by influences from many sources. The earliest inhabitants of Sumatra were neolithic tribes who migrated from mainland Southeast Asia between 2000-1000 B.C. They formed agricultural villages with each community independently developing a way of life based on animistic mythology and ritual (Kahlenberg, 1981). The Batak hill tribes in northern Sumatra have most closely retained this primitive culture due to their isolation.

The Dongson culture, originating in southern Russia, migrated southward to what today is northern Indochina and by the 8th century B.C. had reached Indonesia and assimmilated into the population. Here they exchanged Chinese finished goods for local Indonesian

agricultural products (Kahlenberg, 1977), thus introducing new materials, spatial arrangements, decorative techniques, and design influences. Bronze work was their main product and bronze drums originating from this culture have been found throughout Indonesia. The design on these products is characterized by spirals, curvilineal figures, the tree of life, and ships for the dead. These themes were repeated rythmically and can be recognized today in the textiles, architecture, and metal work of Indonesia (Newman, 1977). The heavy embroidery of ships and trees on textiles from Lampung province in Sumatra is a good example of the Bronze Age legacy (Gittinger, 1979).

By the 1st century AD the Indonesians had established Indian contacts. Indian influences stimulated the development of Hindu kingdoms throughout Java, Bali, and on the coast of Sumatra (Anonymous, 1979; Kahlenberg, 1977). The 7th century kingdom of Srivijaya on the southeast shore of Sumatra was a culmination of this movement. The power of Srivijaya extended over all of South Sumatra and reached the Malay Penninsula and Cambodia. This empire became a center of commerce and Mahayana Buddhism and, in the 9th and 11th centuries, Srivijayan monastries were established in Bengal and South India. Buddhism, court Brahmanism, and new political and legal concepts caused changes in the indigenous coastal chieftaincies as this Sumatran capital developed its own culture with sophisticated forms of literature, dance, and drama typical of a court tradition of pomp and pagentry (Kahlenberg, 1981). In 1377, Srivijaya was conquered by the Javanese (Schnitger, 1939).

In the beginning of the 14th century, Gujarat, a key trading emporium in India was converted to Islam. About this time traders from India, Iran, and northern Africa came to Indonesia bringing with them their Islamic religion which first spread in Sumatra and was adopted by the Acehnese people, the Minangkabau, and Coastal Malays in the area of the old Srivijaya empire. Textiles were the primary medium of exchange (Gittinger, 1979b), but the Islamic religion forbids the representation of human and most animal forms. Therefore, textiles from areas converted to Islam became less animistic in their motifs and tended to portray repetitive geometric and floral patterns instead. The metallic brocade-like textiles so prevalent in some areas of Sumatra also reflect the use of new materials introduced by these cultures and perpetuated by the wealth brought to the island through heavy trade and marketing.

Colonialism began in Indonesia in the 16th century with the arrival of Portuguese, English, and Dutch traders in search of spices. They left a European influence of realistic floral designs which can be seen particularily in Javanese batiks (Kahlenberg, 1977). From the mid-17th century until 1800, Indonesia was governed by the Dutch East India Company followed by the Dutch crown which ruled until Japanese occupation from 1942-1945. Indonesia celebrated its independence on August 17th, 1945. (Gittinger, 1979; Kurian, 1987).

Unfortunately, because the tropical atmosphere of Indonesia is not conducive to the preservation of textiles, there are no traces of the country's rich textile production predating the 19th century (Wardwell,

1985). Influences from various cultures and religions are displayed clearly in the surviving textiles of Indonesia where they have been absorbed and accommodated to varying degrees but have not totally replaced the older indigenous elements. Through all the changes, there continues to be an adherance to 'adat'. This traditional body of customs and laws regulates every aspect of Indonesian life, being deeply rooted in ancient sacred myths and traditions. The survival of 'adat' and the mixing of old and new helps to create the richness and charm found in Indonesian textiles and accounts for the "continuity of highly developed art forms throughout Sumatra" (Kahlenberg, 1981).

Significance of Textiles in Indonesia

The importance of textile art in Southeast Asia can not be over-emphasized. The Buddhist concept of 'oneness' permeates most Southeast Asian thinking about all art. Everything is viewed as inter-related and part of a whole. Art, like religion, is a part of life. It is not a separate entity as in our western sense of aesthetics. Textiles in Southeast Asia are vehicles of communication that speak to both the rich and the poor. Their meanings are their very purpose (Newman, 1977). Textiles, therefore, play a very important role in Indonesian culture.

To the outsider, the initial appeal of Indonesian textiles is their beauty. However, to the Indonesians themselves, textiles have a much greater significance. Weaving symbolizes the structure of the cosmos. The warp threads fastened between the ends of the loom represent the predestined elements of life. The weft, passing in and out and back and forth represent life's variables (Anonymous, 1979). "The weaving process itself sometimes appears to be viewed as a metaphor for life; the weft yarns symbolize the enriching thread of life being drawn across the continuous warp of time" (Anonymous, 1979, p 7). The uncut warp structure of some textiles such as the Batak cloths used at the birth of a child represent the continuing cycle of life through succeeding generations (Anonymous, 1981b).

From ancient times, the natural world, ancestors, the spirit world of the cosmos, and the cycle of fertility and death have been the focus of

Indonesian life and essential themes in Indonesian art. These themes are recurrent in their 'adat'. Textiles are a major form of Indonesian artistic and religious expression and these themes are clearly manifested in their cloths.

Woven textiles serve important functions in the daily life of Indonesians. Besides their primary function as articles of clothing, textiles also "fulfill numerous ritual functions regarded as essential to the continuity of family and community life" (Anonymous, 1979, p 6). Ceremonial cloths are most interesting since, as sacral objects, they are customarily embellished with traditional designs and patterns (Langewis & Wagner, 1964). Some textiles become vessels of magical power or media of communication with the supernatural world. Textiles are an integral part of a person's identity, communicating clues to others about an individual's family, tribe, and social rank. Certain motifs and fine cloths are reserved for the aristocracy. The palepai 'ship cloths' of southern Sumatra, are no longer produced but were restricted in circulation to heads of families and their direct male descendents although the smaller tampan cloths had wide distribution (Anonymous, 1976). Surviving Indonesian textiles become important to contemporary students throughout the world in that the textile designs used may indicate trade patterns and historical events related to Indonesia (Gittinger, 1979b).

An important part of 'adat' is the use of textiles for ritual or ceremonial purposes. Textiles are thought to have curative and protective powers. They are often used in rites of passage to guarantee

safe transition from one life crises situation (birth, circumcision, marriage, death) to another. It is because the weaving traditions have been guarded by 'adat' that they have endured (Anonymous, 1979).

The most important role of textiles is as gifts where gift-giving is rigidly controlled by customary rules. In wedding ceremonies, they are classified as 'female goods' and therefore are usually given from the bride's family (bride-givers) to the groom's family (bride-takers). The gift of textiles symbolizes the sharing of the superior soul force of the bride-givers thus strengthening the soul force of the bride-takers when they are weakened by illness or adversity.

Textiles are intrinsic elements of sacred action used as coverings for food offerings, head coverings for ritual dance, wrappings for victorious weapons, sacred insignia hung as banners, or as coverings to dress the dead. In the case of funerary cloths, they are thought to accompany the deceased to the next world and serve as evidence of high status and wealth, thus ensuring a good after-life (Anonymous, 1981a).

Weaving and textiles are widely thought of as 'female' and are viewed as counterparts to metal work or the sword which is considered a symbol of 'male'. From the picking of the cotton through the spinning, dyeing, weaving, and the final embroidery, all the work is done by women. In a few areas, men may have some input in the designing and textile motifs often reveal a similarity to those used in the metal and woodwork craft done by Indonesian men.

Sumatra

Sumatra, "the island of hope" is the second largest and most western island in the archipelago (Kahlenberg, 1981; Niessen, 1985). Sumatra is divided into eight provinces (Figure 2) with a total population of over 31 million. Its close proximity to the southern tip of the Malay penninsula on the north renders Sumatra guardian over the access between the China Sea to the east and the Indian Ocean to the west. This strategic location has always made Sumatra one of the most important islands in the Indonesian Archipelago. Its trade location, together with a relatively sparse population and a wealth of natural resources (gold, oil, tea, coffee, and rubber), have contributed to the development of several strong and diverse cultures on the island.

Indigenous Peoples of Sumatra

Sumatra is an island inhabited by a diverse mixture of indigenous people, each of whom has absorbed outside influences to varying degrees. Because of trading within the island, and common external trading influences, the textiles from any one area may share some features in common with other areas. However, the textiles from any one area are usually distinguished by the emphasis placed on combinations of motifs, colour and techniques used. This renders the study of Sumatran textiles, as a whole, extremely complex. The five groups of people investigated in this study possess, to the foreigner, some of the most noticeably distinctive textiles in Sumatra.

Figure 2. Island of Sumatra Showing the Eight Provinces and the Location of the Five Major Ethnic Groups.

The Acehnese and Their Textiles

The Acehnese people reside predominately in the province of Aceh, the most northern province in Sumatra and are the product of many centuries of intermarrying with the Bataks, Hindus, Javanese, Arabs, Chinese, and Niasian slaves (Kahlenberg, 1981). Because of the close proximity to the Malay Peninsula, this province was a focal point for trade and was the first area in Indonesia to be influenced by Islamic traders as they travelled through the Straits of Malacca from India.

Acehnese textiles appear to have been strongly influenced by trade and the multi-racial background of the people. Silk and gold metallic threads are used predominantly, reflecting the wealth of a high court culture. Aceh is the only location in Indonesia where silk was manufactured (Niessen, 1989). Patterns are woven in fluid complex geometric designs primarily in somber black, deep wine, and purple. Yellow, orange, blue, and green occur rarely and in limited areas. Gold supplementary wefts are often used to embellish the dark background tones. In some of the older cloths, warp ikat patterns of simple arrow points are arranged in narrow vertical stripes (Gittinger, 1979; Kahlenberg, 1981). The textiles of the Acehness have similar patterning to the textiles of the Minangkabau but both the composition of the motifs and the actual weight of the fabric have a lighter appearance.

The Batak and Their Textiles

The Batak people reside predominately in the interior highland region of the province of North Sumatra. This province neighbours Aceh to the south. Because of the remote interior location, influences from the Dongson culture (8th century B.C.) remain in remarkably pure form. Silk has not been introduced and used as a raw material to any significant extent and cotton remains the primary fiber used for weaving. The Toba Batak use only cotton. Also due to isolation, the decorative effects applied by these people differ greatly from those found on other areas of Sumatra (Langewis & Wagner, 1964; Wardwell, 1985).

There are several tribes of Batak people. The most familiar are the Toba Batak, the Angkola Batak, the Pakpak, the Simalungun, the Mandailing and the Karo Batak. Each group has textiles somewhat distinctive from the other tribes. Bataks produce about 150 types of cloth, however the weavers today seem to specialize and it often takes several weavers to complete the various stages of production (Niessen, 1989). The use and function of Batak textiles is strictly prescribed by 'adat'. Hierarchical structure determines which textiles are appropriate for gift giving and to whom and on what occasion a gift may be given. Violation of custom is thought to endanger the natural, social, and cosmic order (Gittinger, 1979; Kahlenberg, 1981). The importance of textiles in the Batak culture is further evidenced by the fact that as many as 275 textiles may be exchanged at a wedding (Kahlenberg, 1981).

'Ulo' is the general Batak term for cloth. These cloths are somber

blue or deep maroon cottons with simple warp ikat patterning, numerous thin warp stripes, twined borders, and supplementary wefts in simple geometric forms. Ikat patterns in Batak cloths have never been expanded to include recognizable figures. Ulos are distinctive textiles due primarily to the presence of the thin stripes and small flecks. The spatial arrangement composed of three large zones both horizontally and vertically, the decorative borders, and the variation in dyes also aid in textile distinction (Gittinger, 1979; Kahlenberg 1977). Backstrap looms are used for production.

The 'ragidup', meaning the 'pattern of life', is the most sacred, prestigious and complex of the Batak textiles. Each of these textiles is composed of a three-sectioned centerfield panel which is bordered on each side by a narrow strip. The middle portion of the centerfield is usually woven in ikat technique. The decorated end panels of the centerfield are produced by supplementary weft technique and are 'read' by the village elder to predict the future (Kahlenberg, 1981). They are cotton plain weave, with supplementary weft on warp-faced plain weave. Ragidups of the past are particularly interesting since the warp was changed twice during the production of one cloth. The white end panels of the central zone were interlocked with the centerfield by superimposing the white warp yarns over the warp of the centerfield and inserting a few weft yarns to lock the new warp in place. The initial dark warp was cut away and the weaving continued on the white. It is not known why these panels were not woven separately and then sewn into place as were the side panels, but this may be due to the

symbolic meaning of the cloth. Today, they are woven separately (Gittinger, 1979; Kahlenberg, 1977).

The Angkola Batak are culturally similar to the other Batak groups but they weave very distinctive textiles called 'ulos godang' in which they use warp wrapping, twill weave, and beads for decoration instead of only ikat. Beads are inserted in the body of the cloth during the weaving process. Where beading is a part of the border, it is laced into position with the aid of a subsidiary frame after the cloth is removed from the loom.

The Minangkabau and Their Textiles

The Minangkabau people originate in the Padang highlands of the province of West Sumatra but their population radiates outward to the neighbouring hills and to the coastline. The Minangkabau are one of Indonesia's most prominant groups representing one quarter of the total Sumatran population.

Minangkabau weavings are of silk, and gold or silver threads. These materials are only used in areas of strong Indian and Muslim influence. Their distinctive textile designs draw almost totally on supplementary weft patterning with gold yarns. This is often so heavily applied that little of the silk background remains visible (Gittinger, 1979c). Patterns are usually geometric or stylized natural forms such as fern leaves, roots, or tendrils. These are arranged in a tightly organized mosaic-like pattern like that used throughout the Islamic world. Beadwork and braided fringes can also be found on some of their

textiles.

The Minangkabau distinguish between two types of 'kain songket' (gold and silver cloth). 'Kain songket balapak' has heavy gold designs over the entire surface. 'Kain songket batabua (or batabur or babintong)' have designs more widely dispersed, often star-like motifs on a green, red, black, or purple ground colour. As would be expected with strong Islamic influence, human figure motifs are absent on the textiles. Sometimes stylized bird motifs are accepted as long as they are combined with floral motifs and the textile is not worshipped. The majority of songket motifs are based on models from nature represented in geometric form. For example, the triangular form may represent the bamboo tree or sprout. Spirals, triangles, meanders, circles, squares, and other lineal forms probably originated in ancient times. Borders such as the baby duck motif (Figure 3) and fern leaf tendril (Figure 4) provide a horizontal design separating various elements and reflect 'adat's' emphasis on co-operation (Sanday & Kartiwa, 1984). Scattered four or eight-pointed stars or flowers which are a result of Gujarati influence symbolize the spreading of villages or lineages. These stars and flowers are always surrounded by border motifs, which represent the villagers bound by adat. The 'ceremonial plate' (Figure 5) is also an important motif.

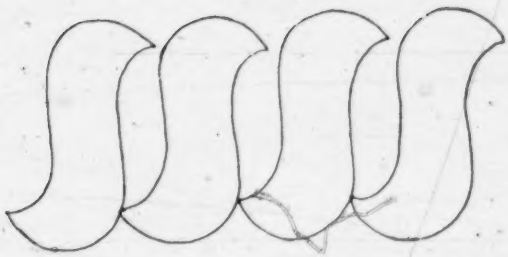

Figure 3. Baby Duck Motif.

Figure 4. Fern Leaf Tendril Motif.

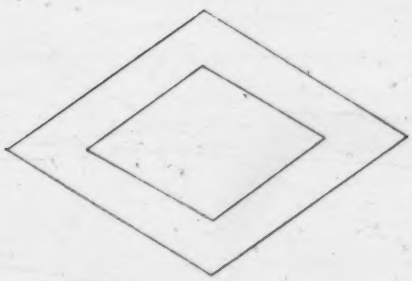

Figure 5. Ceremonial Plate Motif.

The Coastal Malay and Their Textiles

The Coastal Malay are those people of Malay descent who have settled along the eastern coastal area of Sumatra. Within this coastal region, the cities of Jambi and Palembang, are of primary importance. These two harbour cities are strategically located between the Straits of Malacca, bordering Malay, and the Straits of Sunda, bordering Java, thus controlling the two passages used for sea travel and trade between India and China. The textiles of the Coastal Malay reflect the influences of these latter two countries.

The Coastal Malay used ikat technique to weave bright, simple, geometric patterns. These are thought to have been adapted from patola textiles originating in the area of Gujarat, India. Chinese influence is seen in the embroidery , in the use of silk floss, and in the placement of colours and small floral motifs. Islamic influence is seen in the use of metallic threads for geometrically patterned brocade, similar to the Minangkabau and the Acehnese (Kahlenberg 1984).

The city of Jambi is located in Jambi province, midway along the east coast of Sumatra. This area is particularly known for its distinctive batiks which are patterned with small geometric floral motifs arranged closely in horizontal and vertical rows. Muted reds and indigo blues are the primary colours used and some areas of the textiles are enhanced with gold leaf. Designs appear more closely related to those of Indian textiles than those of the Javanese batiks (Gittinger, 1979c). Other than the island of Java which is famous for its sumptuous batik work, Jambi is one of the very few areas in Indonesia

practicing this technique.

Palembang is a harbour city located in the province of South Sumatra. It was the commercial capital of the Srivijaya Empire by the 7th century and it was through this center that silk was probably first introduced to Sumatra. Textiles are typically of silk and often heavily patterned with gold yarns. Pattern is usually introduced in the weft, either in the form of weft ikat, supplementary weft, or weft-faced plain weave. The best known Palembang textiles are of red or red and gold silk which is sometimes entirely patterned with gold yarns. The spatial arrangement of these cloths consists of a centerfield with side and end borders. The centerfield is usually filled with small patterns of flowers, vines, fruits, sun, stars, or geometric patterns. Borders may have narrow rows of bird-like figures. A tumpal row is often seen in the end sections with a striped border in a plain colour. The composition of flame-like motifs on the lateral borders are reminiscent of the Hindu-influenced weft ikats from mainland Southeast Asia. Plangi and tritik may also be used as design techniques on Palembang textiles. The red background colour is usually broken with the use of soft blue, green, purple, and yellow dyes (Gittinger, 1979c; Kahlenberg, 1977).

The textiles from these two areas are extremely oppulent and they visually illustrate the wealth of the high court culture.

Textiles From the Lampung Region

Several distinct tribal groups live in the most southerly province of Sumatra. The various cultures have been strongly influenced by

Indian traders, and through Hinduism, have reached a fairly high degree of civilization (Kahlenberg, 1981). Much foreign contact occured via the Javanese with whom foreigners usually traded directly (Gittinger, 1979). The ships seen on many prominant Lampung textiles are clearly seen on Dongson kettle drums and it is assumed that this ancient culture also influenced textile design. Ancient Lampung was based on patrilineal descent groups and the cultures revolved around 'rites of passage', 'feasts of merit', and gift-giving (Dalrymple, 1984).

The textiles produced in Lampung deserve study due to their distinctive nature. The 'ship cloths' of Lampung "display the most complex woven imagery in all Indonesia" (Anonymous, 1981b). Newman (1977) states that the most striking embroidered and appliqued fabrics in Southeast Asia come from the Lampung District. To date, cloths from this province have been documented more than cloths from any other Sumatran province.

Lampung cloths are of cotton, or cotton and silk. The technique primarily used in their production is continuous and discontinuous supplementary weft on plain weave. Warp ikat, warp-faced plain weave, applique, and warp floats in strips may be woven in or used for embroidery after the initial weaving process is completed. Satin embroidery stitch is most often seen in the interior regions and couching is found along the coastal areas. Finished fabrics may be embellished with mirrors or mica rounds applied with buttonhole stitches and on occasion sequins, shells, or gold coins may be used (Newman, 1977; Gittinger, 1979; Kahlenberg, 1977; Dalrymple, 1984;

Wardwell, 1985). Besides ships, human and animal figures, organic 'trees of life', and flowering plant forms are commonly used motifs. The plant forms represent prosperity and abundance (Anonymous, 1981b). These organic forms can be seen used in conjuction with angular geometric ikat designs.

There are two distinct types of cloths from the Lampung area: 'ship cloths' or ceremonial cloths, and tapis or ceremonial skirts. The ship image is important in both these cloths, symbolizing the movement or transition from one life stage to another. This may take place during 'rites of passage'; transition from one political or social group to another; or transition to a membership in a secret society. The ship also symbolizes 'protection', enabling the 'safe' passage between life stages, which are considered dangerous times (Kahlenberg, 1981). This image is sometimes referred to as the 'ship of the dead' in which the dead are carried to the after-life (Dalrymple, 1984).

Although the skills required to produce 'ship cloths' are now completely lost (Gittinger, 1979b), there is evidence that three types were produced in the past: palepai (of which there are four or five major types), tatibin, and tampan.

Palepai are narrow cloths about three meters long. These cloths were only woven along the extreme south coast, and their use was restricted to the aristocracy. Palepai are hung an a wall to serve as a backdrop for central figures during a ceremony, thus defining the rank and heredity of the owner. Palepai may also be used with tatibin to cover articles to be used in ceremony. Motifs are primarily schematic

forms of houses, trees, and ships. (Gittinger, 1979; Kahlenberg, 1981)

Tatibin are the least numerous of the ship cloths. Like the palepai, they were woven only along the south coast and are used only by the aristocracy. Tatibin are narrow cloths about one meter in length. Tatibin have designs similar to those of palepai but fewer elements are used and these are usually reduced in size (Kahlenberg, 1977).

Tampan, once the most numerous of the 'ship cloths', are now rare. They frequently represent myths or narratives. Tampans are approximately one meter square and unlike the palepai and tatibin, are used by all levels of society. The functions of these symbolic cloths are determined by their size. Function may be as a ritual marker or as part of gift-giving in an exchange between lineages connected through marriage (Kahlenberg, 1981). Tampans are usually composed of simple geometric designs repeated with a border matrix (Kahlenberg, 1977).

The second main category of Lampung textiles, tapis or ceremonial sarongs worn by women, differ from sarongs used in other areas of Indonesia because of primary dependence on embroidery for design. Originally the embroidery was very detailed with gold threads usually couched onto locally woven cloth made with handspun yarns and natural dyes. Deep blue, warm yellow, and rust were the primary colours used (Gittinger, 1979; Dalrymple, 1984). Several types of tapis are distinguishable and each type is representative of a geographical region and its corresponding ethnic group (Gittinger, 1979). Most tapis designs are simple geometric or curvilinear motifs in repeating

horizontal bands. Stars, diamonds, rosettes, squares, triangles, rectangles, hooked rhomboids, and plant forms are common. Tumpal borders are often present. The diamond may be alternated with four-pronged rosettes, circles, and S-scrolls. Unfortunately, documentation of the origins of design motifs and symbolism is sparse and much has been forgotten by the local people (Dalrymple, 1984).

RESEARCH DESIGN

Selection of the Region for Investigation

Sumatra, Indonesia was chosen as the region of focus for data collection because:

1) its strategic location in the Indonesian Archipelago made it very susceptible to the influence of trade, and therefore Sumatran textiles demonstrate a variety of techniques;

2) regions within Sumatra have textiles with distinct regional characteristics; and

3) handweaving and surface design techniques are typically combined in Sumatran textiles.

Methodology

Data collection took the form of an historical study and documentation. Research methods were qualitative with some subjective aspects as described by Schlater (1971). Data collected revealed as completely as possible, within the given limitations, the textile history in Sumatra. This included the significance of textiles in the culture and the motifs, raw materials, dyes, and production techniques used. The textiles of the four major ethnic groups as listed in Kurian (1987) were reviewed individually in order to reveal any distinctions between the regions. The textiles of the Lampung region

were reviewed as a fifth group since these textiles are prominant and distinctive and have been adequately documented. The University of Alberta Clothing and Textile Collection which is housed in the Faculty of Home Economics was used as a primary source of data, as was the Sumatran textile collection located in the Museum of Anthropology, University of British Columbia. Secondary sources of data included books, museum and exhibition catalogues, journals, and unpublished theses and dissertations.

The data collected was documented and used by the designer as inspiration, and therefore as a tool in the design process. Motifs, patterns, colours, dyes, and techniques used in the production of Sumatran textiles from the chosen areas were all considered. The design process entailed several steps which will be discussed later in this section. Preliminary explorations included:

1) black and white motif studies on paper;

2) colour studies using colours that closely reflected those used in Sumatra;

3) studies of motif, pattern, and colour using anniline dyes on waxed rice paper;

4) handwoven samples exploring the use of various weights, types, and combinations of silk and cotton yarn;

5) handwoven, dyed and surface embellished samples using knowledge obtained from the above studies, and combining this with mixed media production techniques inspired by those used in Sumatra, yet still appropriate for use in a

studio setting in western Canada. These samples always included both handweaving and applied decorative design techniques. Since one of the characteristics of Sumatran textiles is their mixed media, techniques of applied decorative design used in the samples included various combinations of warp-painting, wax resist, direct painting, screen printing, tritik and embroidering.

6) Six finished textile panels were completed.

Although each textile has features that have been inspired by the textiles produced by a subjectively chosen Sumatran ethnic group, each panel also contains elements apparent in the other textiles in the final collection. This represents the diversity of technique and media that is apparent in Sumatran textiles and that has been a result of ethnic influences from within and outside of the island. For the final projects the designer chose techniques, medium combinations, motifs, patterns, and colours based on the results of the preliminary studies.

Since the process of designing is evolutionary and based on the designer's personal aesthetics and experience during the active creative process, it was impossible at the time of the initial research design, to accurately predict or state what the exact methodology leading to the final textiles would be. However, all methodology leading to the finished pieces has been documented in the thesis to enable future designers to benefit from this approach to the design process.

Preparation for research began with the subjective selection of the parameters to be used as limitations, and the assemblage of the tools

and equipment (Appendix A) necessary to complete the projects. A journal was kept as a means of keeping complete and accurate records throughout the research; safety precautions were observed; and a series of preliminary experiments and study samples were executed before the final projects were begun.

Subjective Choices

Ethnic Groups Within Sumatra

Textiles from all areas of Sumatra were initially studied. However, due to the minimal information available describing the characteristics of Aceh textiles, and the absence of pieces available for study, textiles from this area were not considered when searching for design inspiration. Textiles from the other five areas studied each contributed some inspiration. The designer was drawn to the abundant use of gold thread, sequins, and mirrors used by the high court cultures in the Minangkabau, Coastal, and Lampung regions. The intriguing spatial arrangements of multiple borders surrounding a centerfield area represent the important aspect of 'adat law' in the Sumatran culture and was apparent throughout their textiles. This spatial arrangement was also chosen as a focal point in the designer's finished textiles.

Raw Materials

1) Fibers.

Silk and cotton were chosen as the fibers appropriate for use in this study since they are the two fibers used in all Sumatran textiles (Table 1). As in Sumatran textiles, silk is the predominant fiber used in this research, composing 75% of the warp and 100% of the weft (excepting the use of the synthetic gold yarn used as embellishment). Silk has properties which make it particularily conducive for use as a fiber to be dyed under tension which is the case in warp-painting: it has good dimensional stability and therefore does not shrink or stretch to any significant degree; it is the strongest of the natural fibers for its weight; and it does not have a protective coating and therefore, reacts quickly to dye molecules at a low temperature. Silk possesses the same dye reactive groups found in cellulose fibers such as cotton, although they occur in a different portion of the fiber. Therefore, cotton and silk will accept the same dyes but will result in slightly different colours. This fact allowed the use of both fibers to produce a mixed fabric with added textural and colour interest. The variety of yarns used and the method with which they were wound and woven also added interesting effects and texture to the woven web. These methods will be further discussed later in the methodology.

The specific yarn types used in this research were:

warp - 2/12 silk noil

2/5 cultured silk

2/12 cultured silk

Table 1. Raw materials used in Sumatran textiles.

	Aceh	Batak	Minang-kabau	Jambi	Palem-bang	Lampung
silk	*		*		*	*
cotton		*		*		*
sequins	*					*
mirrors						*
beads		*	*			
gold leaf				*		

English cotton #

supplementary warp - Wolcentrum Nederland Lurex

weft - 2/12 silk noil

supplementary weft - Wolcentrum Nederland Lerex

2/5 cultured silk

embroidery - 2/12 cultured silk

2) Dyes.

Liquid Procion H fiber-reactive dyes were chosen as the dyestuff for this project. These are synthetic dyes which, after being subjected to a steam-fixation process, become 'one' with the fiber through covalent bonding. This gives the final product good colourfastness for both light and washing. Procion dyes are available in a wide colour range which allows the mixing of most other colours. They also have excellent fiber penetration (Nash, 1981). These dyes produce an even colour on the fiber, they are easy and safe when used as directed. Since they may be used in liquid form the health hazard of inhaling dye particles is eliminated, as is the inconvenience of weighing out powdered dyes.

Motifs

Sumatran motifs and their variations were used throughout the designer's final textiles and were chosen based on the aesthetic appeal to the designer. Eight-pointed stars and flowers are used in abundance as are geometric forms. Motifs such as the 'baby duck', the 'tumpal' borders, and paisley are used in arrangements similar to those in indigenous Sumatran textiles.

Colours

Individual cultures worldwide appear to use certain combinations of hue, intensity, and value in their indigenous textiles. According to Niessen (1982), colour in the Toba Batak culture "could be regarded as the single most significant factor in defining textile styles or types." She further states that traditional textiles "displayed no more than three colours, red, white, and blue". The red and blue colours were originally derived from natural plant dyes. However, with the introduction of chemical dyes, many more colours have been introduced in their more modern textiles (Niessen, 1982). Thus, the choice of colours to be used in the final textiles in this research was important in order that the textiles reflect the cultures of Sumatra. Some hue of deep red is typical as a primary colour in textiles from all areas of Sumatra. Indigo blue is also used frequently (Table 2). For this reason, red was chosen as the primary background colour in the designs. Indigo blue, Turmeric yellow, and two hues of violet were chosen as secondary colours. Since large areas of white can be found in some Sumatran textiles, it was retained in the natural colour of the yarns in some areas of the final pieces. This also served to add 'life' to the design and fabric.

Techniques

The Sumatrans used numerous techniques in the production of their textiles (Table 3). For the purpose of this study, some techniques (supplementary warp, supplementary weft, embroidery, and direct

Table 2. Primary and secondary colours used in Sumatran textiles.

	Aceh	Batak	Minang-kabau	Jambi	Palem-bang	Lampung
Rust						P*
Red			P	P	P	
Wine	P	P				
Blue		P		P	S*	P
Yellow					S	S
Purple	P		P		S	
Green			S		S	
Black	P		P			
White		P		P		
Brown						P

* 'P' denotes 'primary'.
* 'S' denotes 'secondary'.

Table 3. Decorative techniques used in Sumatran textiles.

	Aceh	Batak	Minang-kabau	Jambi	Palem-bang	Lampung
plangi					*	
tritik					*	
supplement. warp						*
supplement. weft	*	*	*		*	*
warp ikat	*	*				*
weft ikat				*	*	
direct painting					*	
batik				*		
songket	*		*		*	
embroidery						*
twined borders		*				
warp wrapping		*				
warp stripes		*				
braided fringes			*			
applique						*

painting) were used which are also used in the production of Sumatran textiles. Other techniques (screen printing and wax resist) were chosen because their use was more practical in the western world design studio and yet the final aesthetic result was representative of Sumatran textiles. Plain and twill are the two weaves used by the Sumatran people. In this research, broken twill weave (Appendix B) was chosen for most areas in the designer textiles because of the pleasing 'pebbly' appearence that results when it is used with a warp of mixed yarns. Plain weave was woven in the warp-painted areas to enhance the clarity of the painted image. The results of study samples, experimenting with the various techniques on the chosen fibers, helped to determine the final choices of the techniques to be chosen for use.

Safety Precautions

Many studio procedures expose the designer to potential health hazards. Unless otherwise labelled, all dyes should be considered potentially toxic. Toxins can enter the body by means of inhalation, absorption through the skin, or by ingestion. Some toxins are not eliminated by the body and may accumulate over time. Allergies may be present or may develop, causing contact dermatitis or bronchial problems. Safety precautions (Appendix C) should be observed in order to minimize risk to those individuals exposed to the dyes during production.

Production of the Designs

The designing process is a multiple-stage evolutionary process leading to the final design product. In this investigation, the design process began with the close visual study of Sumatran textiles to observe typical motifs, colours, production techniques, and spatial arrangements used. Chosen motifs were drawn, enlarged, made smaller, changed, and produced in large numbers using a photocopy machine. The designer then experimented with numerous arrangements of these motifs on a 12 inch by 18 inch area until an aesthetically pleasing arrangement evolved. The resultant croquis-sized black and white design represented the corner section of the textile to be produced. It was smaller in size than the projected final textile but included all motifs to be used, as anticipated at that time.

Numerous photocopied reductions of these designs (Appendix D) were made and colour studies were done using felt pens that approximated the colours used in Sumatran textiles. Particular note was taken of proportion and balance of colour and image within each piece and how the design tended to carry the viewers gaze. A visually pleasing balance of colour and image was the goal.

At this stage, experimental study progressed to weaving with the silk and cotton fibers. One design was chosen and this same design was produced several times using different combinations of techniques and colours to determine which would be both technically and

aesthetically compatible. Other colour studies were done on samples of the handwoven fabric using various Procion dye mixtures. The resulting samples determined the dye formulas to be used in the final designs (Appendix E).

The designer once again returned to work on paper. The original 12 inch by 18 inch designs were enlarged to 18 inches by 26 inches. They were modified to better suite the production techniques to be used and also to accommodate the proposed larger scale.

A textile designer must be able to produce painted renditions (croquis) of the proposed designs to be shown to prospective clients. The croquis in this study showed a corner section of the proposed full-sized textile and were produced using aniline dyes on waxed ricepaper (Fisher & Wolfthal, 1987). At this stage some modifications were made to colour placement.

Production of the Final Textiles

Warping and Dressing the Loom

The production of the final textiles began with the warping of the loom using the chosen fibers of silk and cotton described earlier. Calculations for warp width and length were made based on a 18" X 26" finished product and allowing for 15% shrinkage, 10% take-up, and 1 1/2" extra on each side of each textile to enable it to be stretched over a frame when mounting. The ten yard warp was to be 26" wide. The four yarns chosen for the warp were wound together on the warping-board,

keeping a finger between each of the four strands to prevent tangling and to facilitate even tension during the winding process. Five hundred and twenty ends were wound (130 ends of each yarn). The warp was chained off the warping board and wound onto the back beam of the loom from the front, in the regular manner (Black, 1980). The four yarn types were chosen from the lease sticks in random fashion and the ends were threaded through the heddles in a standard twill pattern (Appendix B). The ends were then double sleyed through a ten dent reed. With the aid of string loops, a supplementary warp rod was loosely attached to the standard apron rod (Figure 6). The warp was then tied to the detachable supplementary rod. A heavy header yarn was woven in plain weave for two inches in order to evenly space the warp.

Preparation for Warp-painting

The first technique used was warp-painting. This technique results in a characteristic blurred image not unlike the effect produced by ikat technique used by the Sumatrans. Nash (1981) was one of few references found that described several techniques that can be used in the process of warp-painting. In this research, the designer adapted the techniques used by Nash in order to better accommodate the equipment and facilities available, and the desired product.

In preparation for warp-painting, groupings of three shots of sewing thread were woven in plain weave and at six inch intervals, for the entire length of the warp. This thread served four purposes.

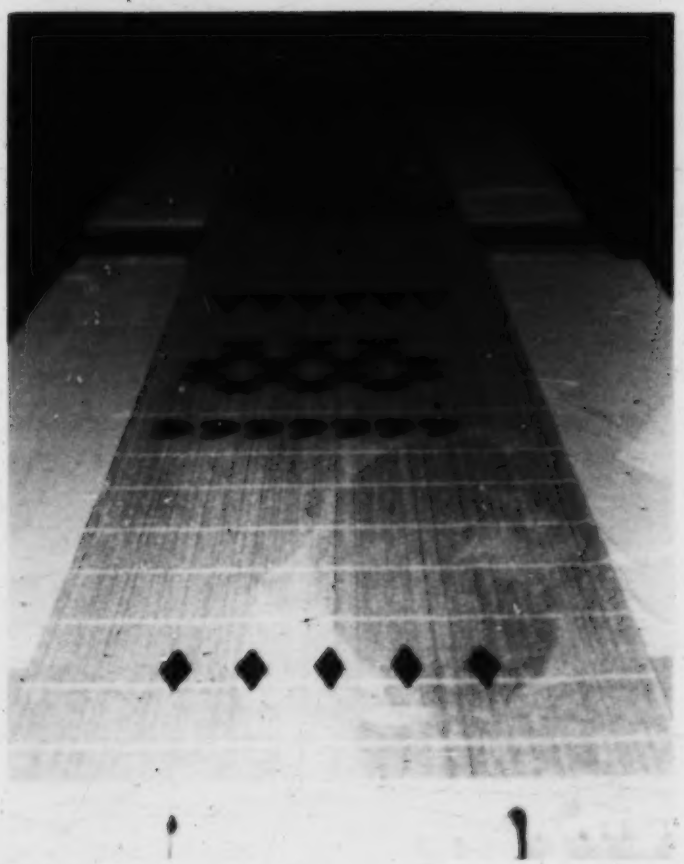

Figure 6. Warp With Supplementary Warp Rod Under Tension.

Primarily it was to maintain the tension and correct sequence of the warp ends as they were pulled off the loom and across the print table in preparation for painting. These threads also maintained the width of the warp, and could be used to serve as guidelines for visually squaring the screen as it was placed on the warp, thus making potential error in placement of the screen quickly apparent before the printing took place. It was important to use fine sewing thread versus a yarn for this step so as not to leave white 'resisted' areas on the dyed pattern.

The warp was then unwound from the front beam and the supplementary warp rod was detatched from the apron rod when the end was reached. The warp was pulled via the supplementary warp rod along the length of the padded print table over which a drop cloth had been stretched. The warp was pulled tight on the table, the supplementary warp rod was squared with the end of the table and C-clamps were used to secure the rod in this position to maintain the tension. The warp was then ready for painting.

Warp-painting

Preparation of the warp.

The warp was first marked with a fast fade pen at one yard intervals. Each one yard interval was to accommodate one design. Within each one yard area, screen registration guildlines were marked to ensure that the print to be made would be square with the warp. Measurements were taken from the design pattern to ensure correct placement of the image, and all measurements were multiplied by 1.2

to allow for take-up and shrinkage of the yarn since the woven web would be washed before the final printing was done.

Screens and stencils.

Wooden frames stretched with 10-XX Stabiltex were used for the screens. The edges of the frames were wrapped with waterproof tape as was a two inch border of Stabiltex on the inside edge of the frame. The two inch border served as the area for receiving the dye-paste. Two materials were used for stencils. Plain newsprint was used when the image would be printed only once. This material was inexpensive and easily disposable making it time efficient. Self-adhering vinyl was used as a stencil when multiple printings were necessary. This product was more expensive but also more durable. It could easily be peeled from the screen and attached to wax paper for use on another occasion. Floating images could also be attached to the screen when the self-adhering vinyl was used. The pattern which was to be transferred to the stencil was placed on a light-table and the vinyl or newsprint was placed over it. The pattern was traced and then cut using an ex-acto knife.

Screen-printing.

The screen was positioned on the warp using the registration lines previously described, as guidelines. Dye-paste was poured into the 2" well of the screen along the whole width of the design. The squeegee was passed through the dye-paste and over the stencil area 15 times. A

board was placed across the warp and next to the screen. Pressure was exerted on this board as the screen was detached from the warp by lifting on one side. This action prevented the warp from being disturbed.

All images to be printed on the warp were completed and the warp was left undisturbed overnight to ensure that the dye was completely dry. The sewing threads previously woven into the warp were then removed. As a result of the printing procedure, the warp ends were stuck together with dye and the printed areas were stuck to the table. A long ruler was placed between the warp and the table and run the length of the warp to separate the two. The individual warp ends in each dyed section were then gently separated to facilitate a smooth movement and even tension as they moved through the reed and heddle-eyes during the re-beaming procedure. The C-clamps holding the warp rod to the table was then detached and the warp was re-beamed onto the back beam. The supplementary warp rod was once again tied to the apron rod and the warp was ready for weaving.

Supplementary Warp

Golden Lurex was used for the supplementary warp. In most cases, a single strand of Lurex was twisted tightly and then folded onto itself, where it twisted in reverse, forming a heavier 2-ply yarn. Placement of the supplementary warp was measured from the paper pattern, multiplying all measurements by 1.2 to allow for take-up and shrinkage during the washing process. Each yarn to be used as

supplementary warp was pinned to the web at the beginning of the textile. It was then threaded straight through the reed, between the heddles without passing through any heddle-eye, and out over the back beam where it was weighted to create a tension equivalent to that of the primary warp. As the loom was treadled during the weaving process, the supplementary warp remained high and out of the way of the shuttle. To incorporate the supplementary warp into the web, the supplementary warp threads were lowered manually using a pick-up stick so the shuttle would pass over them during the throwing of the shuttle. The supplementary warp threads were incorporated into the web only every eight shots to maximize their decorative effect on the web.

Supplementary Weft

Supplementary weft was inserted manually, on top of the base silk yarn, at locations indicated on the pattern. A flat pick-up stick was inserted under every eighth warp thread. The stick was then turned on its side create a shed and the supplementary weft yarn was inserted into this shed. The shot was beaten as usual.

When the warp was completely woven off it was removed from the loom. The individual designs were divided with a serger to prevent fraying. The textiles were then rolled with plain newsprint between each piece and steamed for thirty minutes. After steaming the pieces were washed individually in cool, running water. The temperature of the water was slowly increased and the pieces were washed until the

water ran clear. The textiles were then machine washed in hot water and Synthropol detergent. After washing, the textiles were laid on a clean padded table where they were blocked and pinned to dry. The textile webs were then ready for further decoration using screen printing, direct painting, and wax resist techniques. These methods were used in whichever order was most convenient at the time. Direct painting was often applied after a screen had been printed so that the screen-printed image had some chance to partially dry before another screen was set on the fabric.

Screen Printing

The screen printing method was the same as that described for warp painting. The use of the clear self-adhering vinyl allowed the printer to view the previously printed areas through the stencil thus ensuring accurate registration.

Direct Painting

Direct painting with a synthetic brush was used on all small floral areas. By using the thickened dye-paste that had been used for screen printing, clear edged images could be achieved. Direct painting was also used for all stripes. Because these areas were larger, it was important to try to be consistant in the amount of dye-paste applied and to work the dye-paste into the fabric with the brush.

Wax Resist

When the dye was dry, a 50/50 mixture of beeswax and paraffin was applied with a natural bristle paint brush to all patterns that were to retain their colour. Two coats of wax were necessary due to the texture and thickness of the handwoven fabric. The surface of the second coat of wax was fairly smooth. Wax was also painted on the undyed fabric in design #3 to retain the natural colour of the fabric in the floral images.

Background Colour

The background area was the last to be dyed. All areas not to be dyed were masked out using newsprint. A large screen was used and the background colour was screened over all waxed patterns in the respective area. After the screen was removed from the fabric, the beads of dye remaining on the surface of the wax patterns were removed carefully using dry kleenex tissue and Q-tips. These waxed patterns were cleaned again using wet Q-tips once the dye had dried.

The finishing process included steaming the fabric and washing out the excess dye as described in the previous section. Drycleaning the textiles to remove any residual wax completed this stage.

Embellishment

Further decoration of the textiles included the application of sequins, mirrors, and gold Lurex. Sequins were individually sewn onto the textiles using invisible sewing thread. Mirrors were applied by

embroidering around each using silk floss (Appendix F). Gold Lurex was applied using a satin stitch for solid areas such as leaves, and couching for long strands of thread. These were the two embroidery techniques used by the Sumatrans.

DESIGNER'S STATEMENT

The six textiles produced in this study represent the designer's interpretation of Sumatran textiles. Their production shows that Sumatran textiles can be used as inspiration for contemporary textiles.

Sumatran textiles represent, to the designer, the epitome of the diverse influences seen in textiles worldwide. This diversity of influences results in the constant changing of textiles, both in their production methods and in their visual appearance. Strong influences from both east and west have resulted in what are today considered indigenous Sumatran textiles. Indian influence can be seen in the tumpal borders, and in the bright simple geometric patterns. Silk floss embroidery and small floral motifs show Chinese influence. Islamic influence is seen in the heavy use of metallic threads, sequins, and mirrors, and in the absence of human and animal figures. The textiles produced in this study continue this evolution in textile design and add to the diversity of influences seen in our culture by combining contemporary yarns, dyes, techniques and visual imagery.

Analysis

Unity

Although each textile produced in this project is unique, there are similarities that hold them together as a collection. This is primarily a result of the use of common colours, raw materials, production

techniques and source of inspiration. Each textile was woven in silk, cotton, and synthetic gold yarn using plain weave, broken twill weave, and supplementary warp and weft. Decoration was applied to each textile using screen printing, direct painting, wax resist, embroidery, sequins, and mirrors. Warp printing was used as a decoration technique in textiles # 2, 3, 4, 5, and 6. The finished size of the framed panels is 26 1/2 inches by 19 1/2 inches.

The colours red, blue, purple, and yellow which were used throughout the textiles, were inspired by textiles from the coastal region of Palembang. Textiles from this area usually had deep red as the background colour, supplemented by numerous secondary colours used for the patterns. Table 2 shows that textiles from the Palembang region were typically richer in variety of colour than those textiles from other regions of Sumatra.

Wax was used as a resist on all the textiles. The use of wax was inspired by textiles of the Jambi region. This was the only area of Sumatra where batik was employed as a medium of textile production. Immersion dyeing, typical of batik, was not employed in this study. Wax was used to retain the colour of the fabric when a second colour was screen printed over it.

Textiles from the Lampung area inspired the use of sequins, mirrors, and embroidery as embellishments to the textiles. The designer incorporated these techniques in all six finished cloths. The mirrors are attached using silk floss, and the satin stitching and couching is embroidered with gold yarn as it is done in Lampung.

Motifs and spacial arrangements are also similar in all the final textiles. The mixed floral and geometric theme is apparent in the use of four and eight-pointed stars and flowers. Since the use of heavy borders and a centerfield is common in textiles from all areas of Sumatra, variations of this theme were chosen as a focal point in all six textiles but each border has a different spatial arrangement, often inspired by a specific textile from one of the chosen regions.

Other aspects of the textiles are not common to all of the pieces and were inspired on a more individual basis. The large white areas retained on designs 1,2,4, and 6 were common in some of the batik textiles from the Jambi area and also in the Batak 'ulos'. In designs 3 and 5, smaller areas of white have been retained to add liveliness to the cloths and to unite them visually with the rest of the textiles. The use of warp-painting, seen in designs 2,3,4,5, and 6, was inspired by the ikat technique used by many of the Sumatran peoples. Since ikat is a very time-consuming process, warp-painting was viewed by the designer as a more appropriate technique for use in the western world design studio.

Each of the textiles is to be viewed as a blend of influences from the chosen areas in Sumatra. In each case, particular design features have been more strongly inspired by the textiles of one particular area, and in come cases, by a specific type of cloth. However, all the textiles reflect the general feeling of diversity in Sumatran textiles and culture, as perceived by the designer.

Design #1

Design #1 (Figure 7) incorporates inspiration from the Minangkabau people as will be noted in the use of the 'baby duck' pattern on the left-hand side border. The idea of selectively spaced gold-couched flowers in the center-field was inspired by the Minangkabau's 'kain songket batabua'. This is the name given to a textile in which the gold designs were more widely dispersed in the design. The high contrast of positive and negative space in the centerfield, combined with the spaced gold-couched flowers offers dimension and interest to this textile. The mirrors in the tumpal border help to balance the design by countering the visual weight of the gold floral images. Balance is also achieved by the combined use of horizontal and vertical layout of motifs, and by the retention of areas of white throughout the panel.

Figure 7. Textile #1

Design #2

The motifs and spatial arrangements in Design #2 (Figure 8) were inspired by the textiles in the Palembang region. Many textiles from this area display outside borders which turn at the corner and continue with the same pattern as an end border (Figure 9). This characteristic distinguishes Design #2 from the other five designs. The strong Indian influence characteristic of Palembang textiles is evident in the use of the paisley motif. The effect of ikat was achieved by warp-painting and is the dominant feature offering continuity and balance throughout this textile. The use of warp-painting to capture the look of ikat was inspired by the heavy use of ikat by the Coastal Malays living in the Jambi and Palembang regions. Gold thread has been used sparingly so as not to visually overpower the delicateness of the warp-painted images.

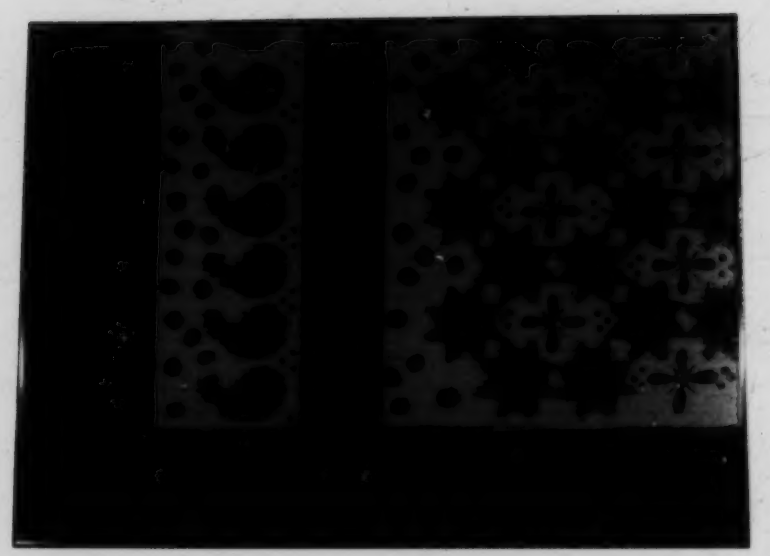

Figure 8. Textile #2

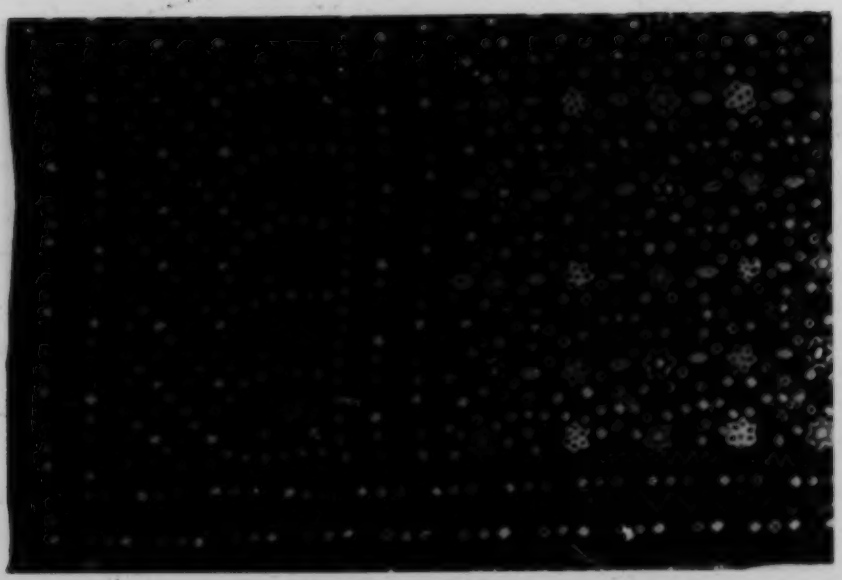

Figure 9. Palembang Textile Showing Border Turning at Corner.

Design #3

Design #3 (Figure 10) was inspired by textiles from the coastal areas of Jambi and Palembang. The spatial arrangement with the side border extending from end to end and an internal decorative panel totally surrounded by its own border is typical of some Jambi batik cloths (Figure 11). The changing lower border is also influenced by Jambi batiks. The floral motifs in the centerfield, and their arrangement, were inspired by the plangi textiles of Palembang. The gold thread, the sequins, and the mirror-work represent other elaborate textiles from the Palembang region and serve to unite this cloth with the rest of the textiles produced.

Figure 10. Textile #3.

Figure 11. Typical Spatial Arrangement of Jambi Batik.

Design #4

Design #4 (Figure 12) reflects the combination of ikat with songket work seen in some Palembang cloths (Figure 13). The curvilinear floral motifs in the centerfield and the tumpal borders are also typical in these textiles. A multiple component border covers the end of the cloth from side to side, thus interupting the side border midway. This spatial arrangement can be seen in cloths from the Palembang area. The white retained in the border area serves to balance the white in the centerfield, however because it extends from edge to edge vertically, it perhaps becomes too heavy in itself and would have been more successful if it had reached only the top edge.

Figure 12. Textile #4.

Figure 13. Palembang Cloth With Ikat and Songket Work.

Design #5

Design #5 (Figure 14) was inspired by a Minangkabau cloth (Figure 15). This cloth has a ceremonial plate motif border near the end of the cloth. The floral motifs in the centerfield panel are repeated unchanged in the end border, creating less variety in this cloth than in the other cloths previously studied. Continuity is achieved throughout this textile by the distinctly horizontal placement of gold embroidered motifs and sequins. The motif repeated along the lower border in Design #5 represents the fern leaf tendril which can be seen repeatedly in Minangkabau textiles and architecture. The heavy use of gold thread can be seen in many Minangkabau cloths and is represented in this textile.

Figure 14. Textile #5.

Figure 15. Minangkabau Cloth Inspiring Textile #5.

Design #6

Design #6 (Figure 16) was inspired by the ceremonial headcloths worn in the Palembang region (Figure 17). The distinguishing feature is the highly ornate triangular area in the corner of the centerfield which is typical of Palembang headcloths. In this textile, the ornateness of the triangle serves to visually weight the inside corner of the centerfield area, preventing the viewer's gaze from being carried to the upper right corner due to the delicateness of the white background. The spatial arrangement of the ornate side and end borders with their corner section is also represented in Design #6. The warp-painted floral images in the centerfield in the design reflect the character of the ikat technique used in the Palembang headcloths.

Figure 16. Textile #6.

Figure 17. Headcloth from Palembang Region.

DISCUSSION

One of the major challenges involved in this study was to find a point where science and art could happily co-exist. The documentary nature of the historical background satisfies Compton & Hall's (1972) definition of documentary scientific research, and the objective descriptions of the Sumatran textiles themselves were used to set the limitations within which the final applied textiles were created. The choices of which ethnic groups, raw materials, techniques, colours, and motifs to use were limitations objectively made based on availability of sufficient background knowledge, on the practicality of production in the contemporary western world studio, and on the results of methodical and systematic colour and technical studies conducted prior to the production of the finished textiles. Within the stated limitations, designs were adapted and combined allowing room for artistic license based on the personal aesthetics of the designer. This renders subjectivity to the final textiles produced.

The purpose of this study was not to reproduce or copy Sumatran textiles, but to be inspired by them, resulting in the production of aesthetically pleasing original contemporary pieces. According to Compton and Hall, the concept of aesthetics must be related to at least one of the three physiological sensations of sight, touch, or kinesthetics and these sensations can be evaluated subjectively. Aesthetics in this research encompasses all three aspects. The actual creation of the textiles contributed to visual, tactile, and kinesthetic aesthetic

fulfilment for the artist. The perception of aesthetics provides visual pleasure for the audience.

The grey area of scientific/artistic co-existance is large; however the designer feels the goal of merging these two issues has been achieved in this study.

Tension in Art

In addition to creativity, part of the challenge for the designer in creating these textiles, lay in the fact that the designs were executed with precision, but with the knowledge that in the production process other influencing factors would contribute to changes that would lead to the evolution of the designs.. From the designing on paper to the production in cloth, there was no way of knowing exactly what the final product would be. This introduced an element of the unknown, and an element of risk to the production process. No matter how carefully the initial exploration and preparation had been executed, there was always the possibility that the final design on cloth might not succeed aesthetically. This created a tension that the designer used to sustain her energy as she strove for perfection.

One of the characteristics of art is that it creates some feeling of tension also within the viewing audience. It was with this in mind that the designer chose to represent only corner sections of the traditionally symmetrical Sumatran textiles. The visual perception of the pattern

and borders running over the edges on two sides should leave the viewer with a subconscious anticipation of what the discontinued pattern would be.

Contributions of This Research

The results of this study contribute in several ways to the improvement of the quality of life for individuals.

The textiles produced as a result of this study will contribute to the physical aspect of man's near environment by adding beauty and satisfaction to the home or office setting. Creative project research, as conducted in this study, is important to assist designers in introducing new ideas which may be used by professionals in other fields. For example, ethnic clothing is currently popular on the international fashion scene. Textile designs produced in this research may offer further stimulus to fashion designers who may continue to create using this evolution of design inspired by Sumatran textiles.

The psychological aspect of human life is also important. Human psychological development necessitates some understanding of interactions between individuals and their surroundings. Personal development may include an understanding of this relationship in various cultures. By using and documenting cross-cultural sources as inspiration, the textile designer creates a link between countries and may indirectly create some understanding and appreciation of the

adopted culture. Documentation of the textile design process also serves to encourage creative thought processes and the development of problem-solving skills in future designers.

The results of this study will also serve to improve community service by offering new information which may be used for educational purposes.

Personal Benefits

As an individual, the designer has benefitted in many ways from this research. The documentary type of research methods required to begin the process resulted in an understanding of the Sumatran peoples and their diverse cultures. The creative process itself was personally fulfilling through self-expression as the designer sought to solve one problem after another in search of a solution. The designer was able to view the final textile designs and experience the excitement and emotion that is felt with aesthetic appreciation and with the successful resolution of problems.

Humanizing the Environment

Communication through visual, tactile, and kinesthetic stimulation is a vital component to our healthy existance. Through it,

the impersonal aspects of our technical and scientific world may be humanized by reviving the concepts of the uniqueness of individual existence and expression. This, as the designer sees it, is the most important outcome of her research. The numerous ways research in the field of textile design contributes to the complex, multifacited concept of aesthetics helps to humanize our environment and makes our world a more pleasant and rewarding place in which to live.

Recommendations for Further Research

Due to the lack of a comprehensive study of the textiles of the various Sumatran groups, the designer found it necessary to generalize the Sumatran textile descriptions based on access to limited primary source material and to a broad but scattered selection of secondary source information. A systematic study of the patterns used in the textiles of the individual groups of people indigenous to the island of Sumatra would assist future designers to focus more fully on the specific textiles produced by one of the cultural groups.

There are other cultures world-wide whose textiles also have not systematically been studied and documented to date. The manner in which this project proceeded can be used as a model for further cross-cultural design studies.

The textiles produced in this study represent only one solution to a problem. Any other designer would no doubt interpret the same textiles

using the same parameters in a different manner and with a different result. Studies could be conducted using the Sumatran techniques not chosen for use by this designer in this study. Such techniques may include plangi, tritik, immersion dyeing, ikat, and batik. Inspiration could also focus on the symbolism so prevalent in Sumatran textiles.

Further studies of the human aesthetic response to visual stimuli would aid in determining any apparent patterns in aesthetic pleasure. This would perhaps offer more objective methods of determining whether a design was aesthetic and therefore successful.

A consistent and unexplained phenomenon occurred on several of the six textiles produced in this study. The dyed cotton warp present in areas that had been waxed, appeared much lighter than the dyed silk warp in the same regions. This resulted in a prominent speckled effect and contrasted to the relatively even dyeing of silk and cotton in the unwaxed areas. This phenomenon causes the designer to question the chemical effect of wax on dyed cotton and offers room for further research.

The effects of drycleaning on synthetic gold threads would be another area for further research. The gold thread in the textile samples produced in this study were not affected during the drycleaning process. However, some of the gold thread used in the textiles lost their finish during drycleaning and had to be replaced. Further research concerning the effect of drycleaning solvents on synthetic yarns would be beneficial.

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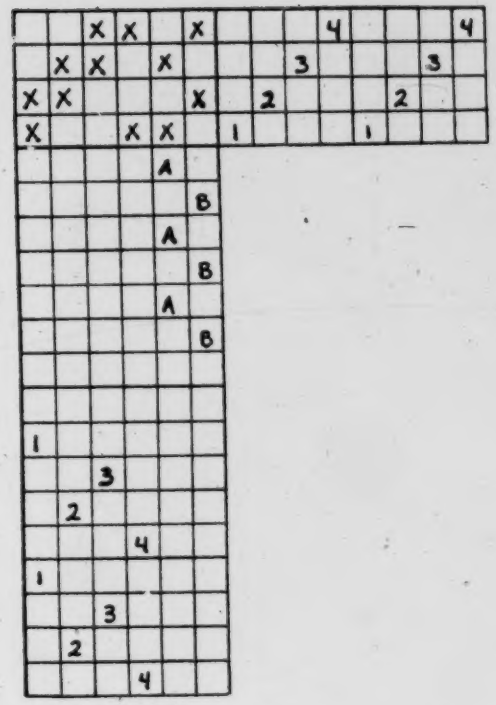
APPENDIX A

Tools and Equipment

glass jars for dye
glass or stainless steel measuring spoons
rubber gloves and plastic apron
masking tape for labelling and taping stencils to screen
plain newsprint
self-adhesive vinyl (Mac Tac)
exacto knife
water-proof pen for labelling
light table
steamer
four-harness loom (minimum of 26" wide)
beeswax and parafin
brushes for wax
brushes for dyes
10-XX Stabiltex silk screen frames
fast fade marking pen
paper towels
journal for record-keeping
liquid Procion H fiber-reactive dyes
Synthropol detergent
Calgon
Ludigol
Urea
Sodium alginate - dye thickener
C-clamps
straight pins
measuring tape

APPENDIX B

Weaving Drafts



APPENDIX C

Safety Precautions

1) Protect skin and clothing from dye contact by wearing latex gloves and some form of lab coat or smock.

2) Do not use dyes in any area where food is prepared and do not eat, drink, or smoke in the studio.

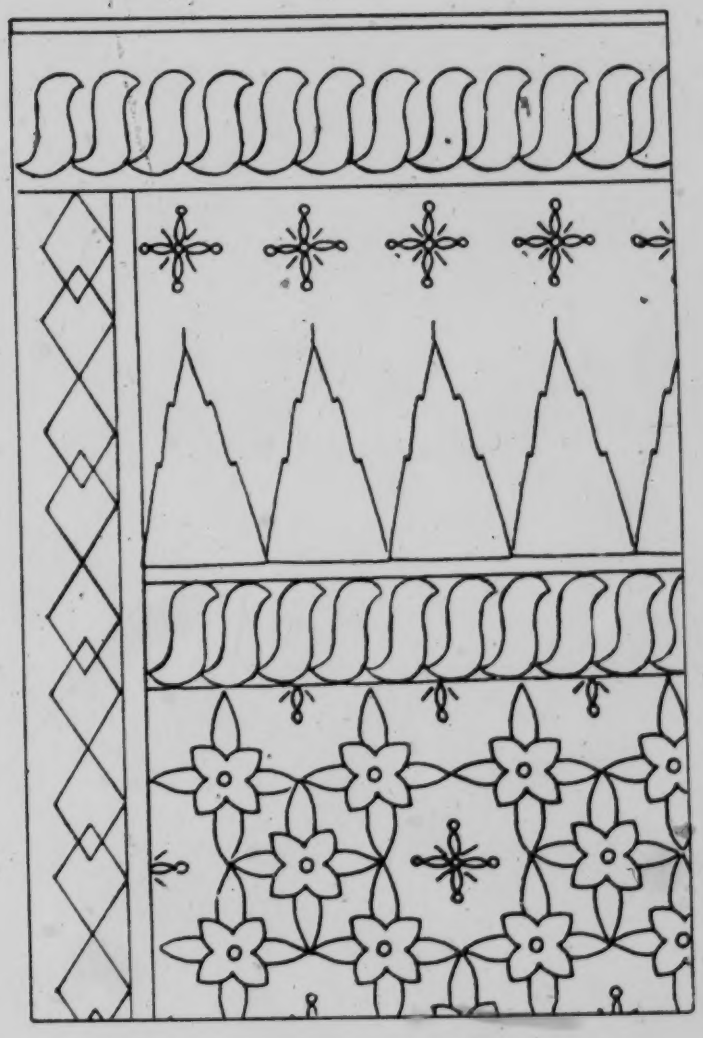
3) All implements for dyeing should be used only for this purpose. Never use kitchen utensils.

4) Breathing in the powdered dye is potentially the most dangerous hazard in the dying process (Baker, 1983). When working with dyes in a powdered state or dyes that give off fumes, wear a suitable carbon filter mask and have good ventilation. Work in a fume hood if possible.

5) Clearly label all materials and store out of the reach of children and pets.

APPENDIX D

Reductions of Original Designs



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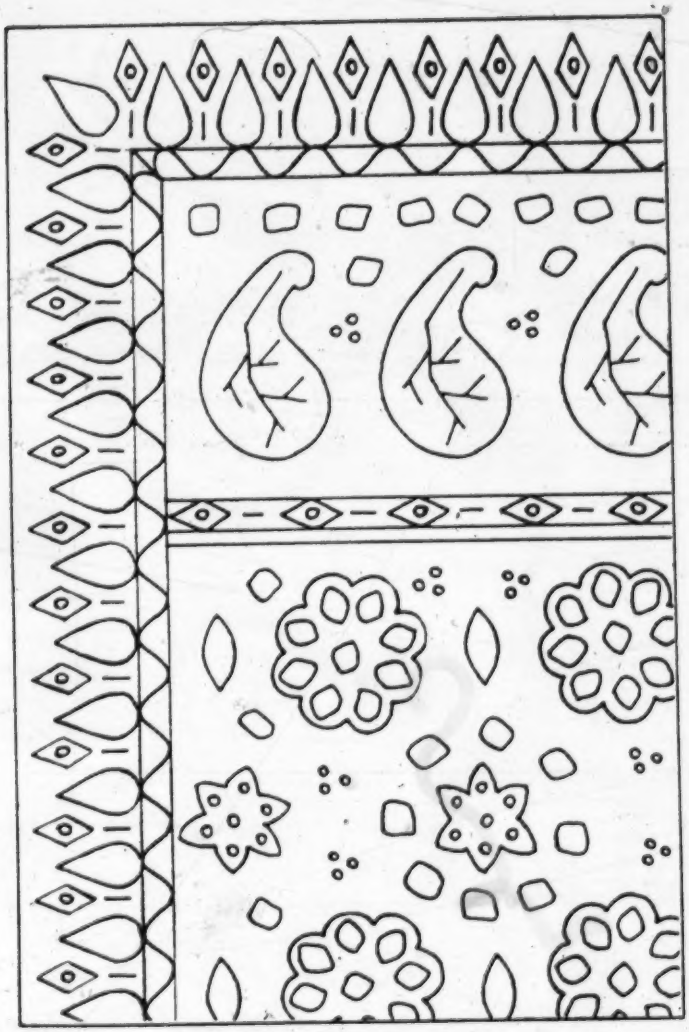

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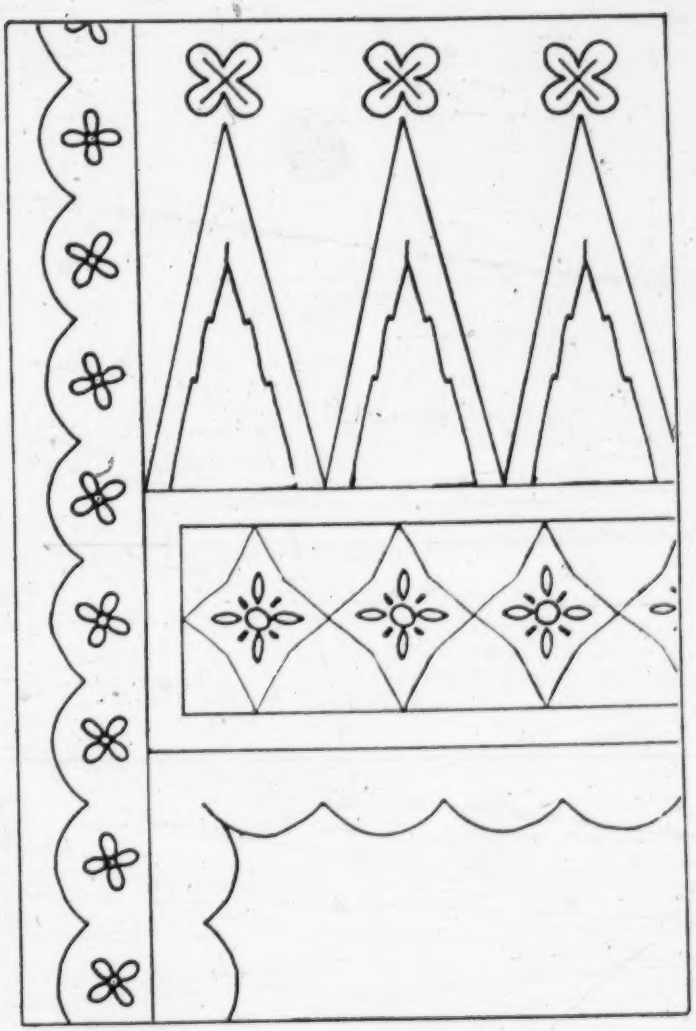

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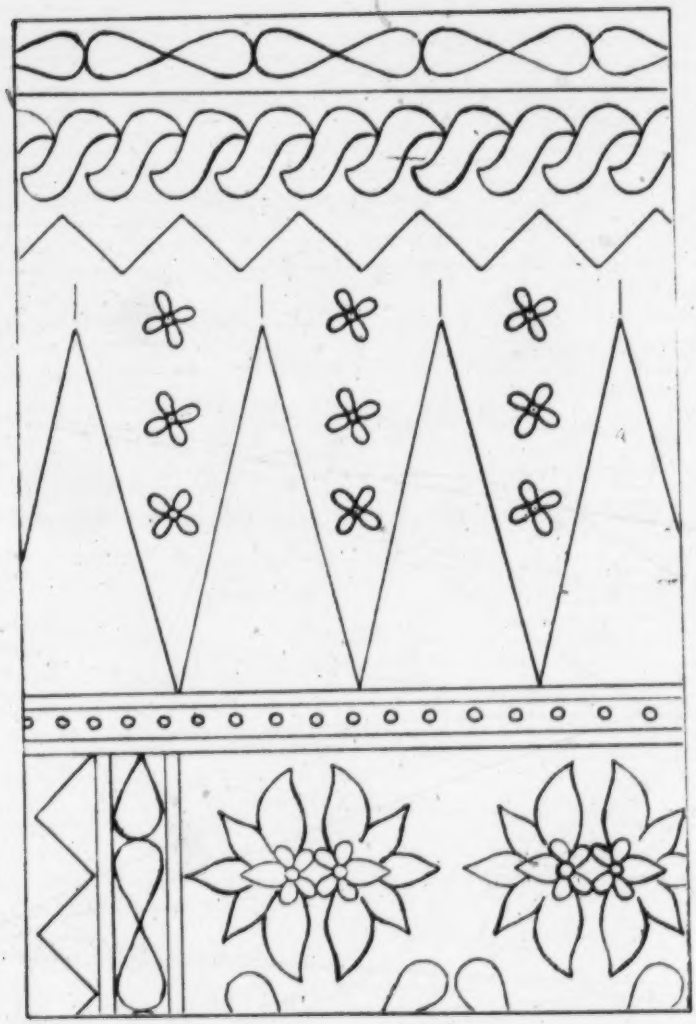

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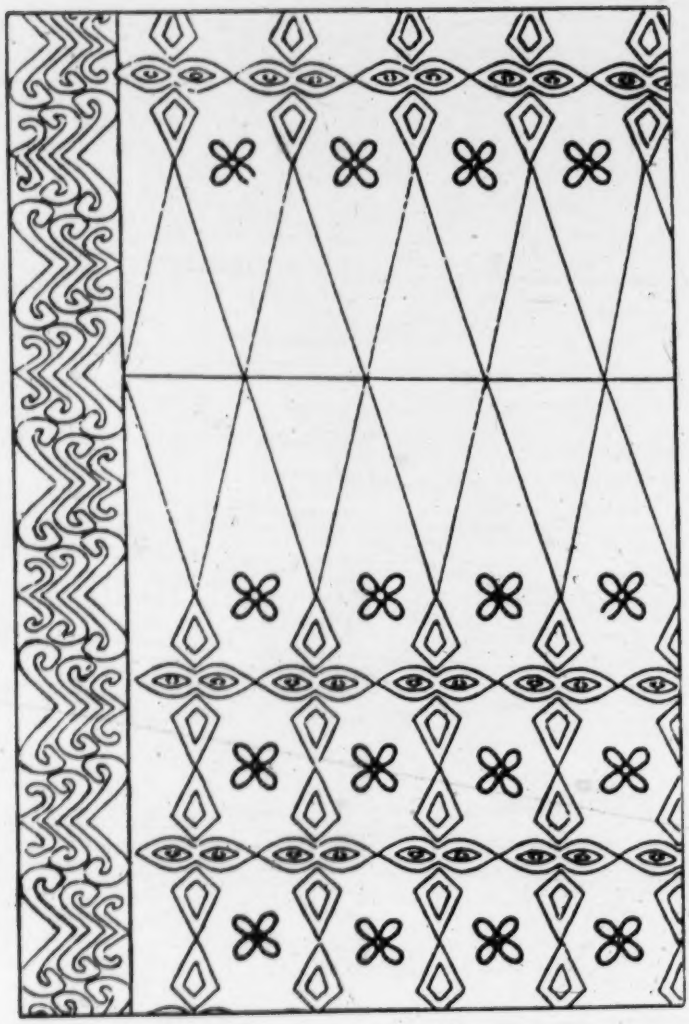

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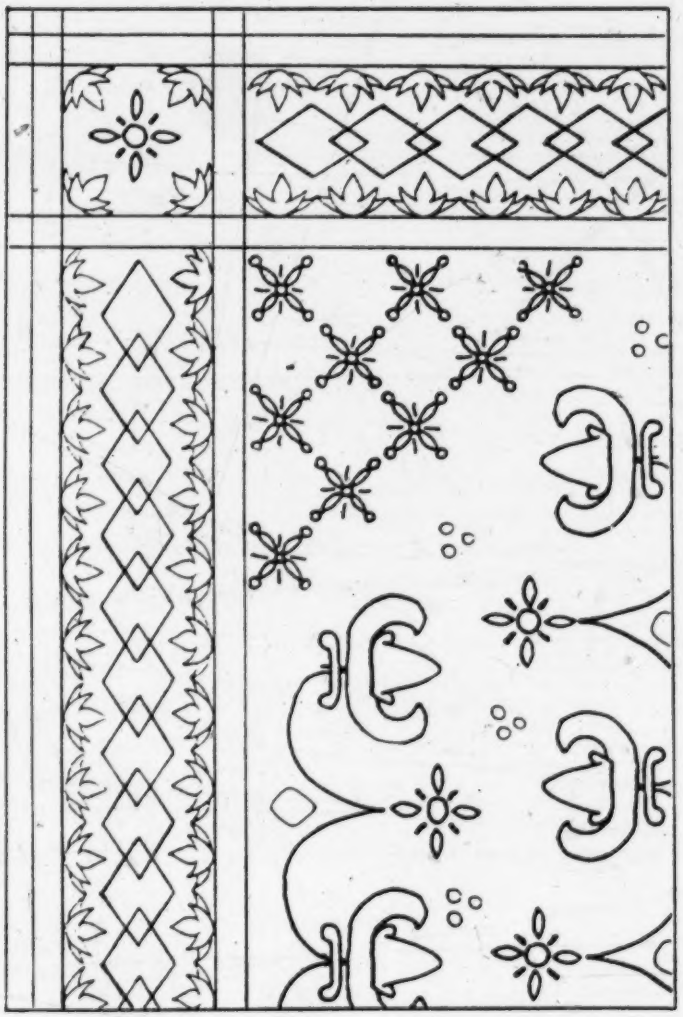


Design #6

APPENDIX E

Dye Formulas

Chemical water: modified for use on a mixed silk and cotton fiber.

Calgon - 1 tsp

Urea - 7 tsp

Ludigol - 2 tsp

Stir Calgon, urea, and ludigol into 2 cups of hot water until the chemicals are dissolved. Add cold water to make 1 quart and shake well. Chemical water may be stored indefinitely at room temperature.

Sodium Alginate: dye thickener

Sodium alginate H - 4 tsp

Chemical water - 1 quart

Slowly sprinkle Sodium alginate over chemical water and stir constantly for 10 minutes; or use a studio blender on 'stir' setting for 10 minutes. Let mixture stand for up to 1 hour to thicken and stir again. Thickener may be stored, refrigerated for several months.

APPENDIX E (cont.)

Liquid Procion H Dye

Stock Solutions:

	Alginate	Liquid dye	Baking soda
True red	4 oz	4 tsp	1 tsp
Brown	4 oz	2 tsp	1 tsp
Royal Blue	4 oz	2 tsp	1 tsp
Gold Yellow	4 oz	2 tsp	1 tsp
Blue Violet	4 oz	2 tsp	1 tsp
Black	4 oz	4 tsp	1 tsp*

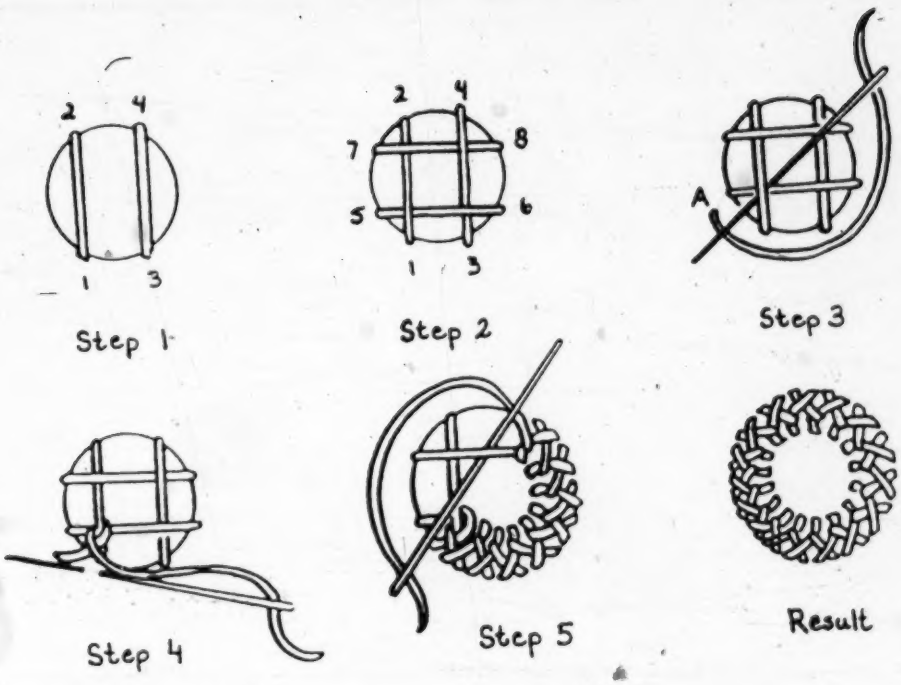
*Use soda ash instead of baking soda

Mixed Dyes:

Red	- 1 part true red : 1 part brown
Indigo Blue	- 1 part royal blue : 4 parts black
Turmeric Gold	- 4 oz gold yellow : 1 tsp brown
Red Violet	- 2 parts blue violet : 1 part true red
Blue Violet	- 1 part red violet : 1 part indigo blue

Appendix F

Mirror Application



Step 1 - Bring needle up at 1, down at 2, up at 3, and down at 4.

Step 2 - Bring needle up at 5, down at 6, up at 7, and down at 8.

Step 3 - Bring the needle up at 'A', and with the thread counterclockwise and the needle pointing toward you, bring the needle over and then slide it back under the framework mesh, pulling gently toward you.

Step 4 - With the thread up and the needle pointing toward the left and parallel to the mirror, go down at 'B' and up at 'C', pulling gently.

Step 5 - Continue working counterclockwise around the mirror, following the movements in steps 3 and 4, until you are all the way around the mirror (Simpson, 1978).

Appendix G

Glossary

adat - customs and religion that control much of the social and religious life in Sumatra.

analine dye - a coal tar derivative dye.

beaming - the process of winding the warp onto the loom.

dressing the loom - includes all processes involved in preparing the loom for weaving: beaming, threading the harnesses, sleying the reed, and tieing the warp to the apron rod.

fastness - the degree to which a fiber will retain its colour over time.

fixing - the process of setting the dye or pigment to ensure fastness.

motif - a single unit building block in a design.

pattern - the repetative use of a motif.

plangi - a resist-dye process in which small areas of textile are bound with cord or palm strip that reserves the area from dye. Patterns are generally built up from circular forms.

shot/pick - one length of weft across the warp.

plain weave (tabby) - a weave structure characterized by a 1/1

regular interlacement of warp and weft yarns. Each weft yarn moves alternately over and under adjacent warp ends. The sequence is reversed in the following weft shot.

sett - the number of warp ends per inch.

sleying - the process of drawing the warp yarns through the reed.

songket - supplementary weft patterning usually done with gold thread.

soda ash - washing soda or sodium carbonate.

sodium alginate - a seaweed derivative used for thickening dyes to produce dye paste, facilitating less bleeding and a crisper outline of the image.

steam setting - the process of fixing the dyes in a fabric by a timed exposure to heat and moisture.

supplementary warp - a decorative weaving technique where additional warp threads are added at the same time as the base warp thread.

supplementary weft - a decorative weaving technique where additional weft threads are added at the same time as the base weft thread.

Synthrapol - an inert detergent which helps to prevent staining of white or light areas of fiber during the washing procedure, after fixation.

take-up - the amount that the fabric width and length is decreased by

the over and under action of the weft interlacing with the warp.

tumpal - the triangular shaped motif seen in Indonesian textiles.

twill - a basic weave structure in which the weft yarn interlaces over one warp yarn and under two or more others, producing a characteristic diagonal pattern.

twill (broken) - the characteristic diagonal structure of the twill weave is interupted by changing the treadling sequence. The result is a textured pebble-like surface.

unfixed dye - the dye that has not chemically reacted with the fiber. It will be rinsed off the fabric during washing.

urea - acts as a hygroscopic agent, drawing moisture from the atmosphere.

warp - the lengthwise yarns in the loom or in a woven fabric.

weft - the crosswise yarns in a woven fabric.